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Vulcanized Latex Molds for Plaster Casting

Use of Latex in Manufacture of Rubber Molds Overcomes Drawbacks of Glue Molds for Plaster Casting

By Adolph Silver

IT IS NOW possible to make vulcanized latex molds that completely overcome most of the problems encountered in the ornamental plaster casting shop. Plaster casting is generally accomplished in flexible glue molds. These molds have many drawbacks. Though many attempts have been made to substitute a compound that would overcome its several difficulties, glue, nevertheless, with all of its shortcomings, is still very much in general use.

The main deficiency of glue is its susceptibility to heat and water. A plastic mix of water and plaster, once it sets hard in casting, generates heat. We therefore have two factors injurious to the glue which are always present in the process of casting plaster. Great skill and ingenuity are necessary to manipulate the mold and plaster mix in order to overcome the deficiencies of the glue. Plaster casting in glue molds, therefore, is a highly skilled craft, and can be successfully accomplished only after long practice and experience.

Even in the hands of a skilled operator, the average number of good casts possible with the same glue mold is about fifty. After that number is reached, the surface of the mold begins to deteriorate, regardless of the care expended, and the casts lack the clearness and detail called for and secured with the earlier castings. Furthermore, because the operator must manipulate the plaster mix in such a manner to best overcome the susceptibility of the glue mold to heat and water, a weak and chalky plaster cast is invariably the result.

There are a number of casting materials now on the market which cannot be cast in glue molds, be the craftsman ever so skilled, because many of them must be cast while hot and others require a long period of time to set. The surface of a glue mold, when kept in contact with a wet mixture that takes a comparatively long time to harden, absorbs water, swells the glue, and ruins the mold.

The vulcanized latex mold overcomes entirely the above difficulties and deficiencies. It is not affected by water or heat under any conditions or by any type of casting material. The skill called for when the glue mold is used is not as necessary when a vulcanized latex mold is used—although such skill is a decided asset. Vulcanized latex molds have unlimited use. Thousands of casts can be made from a single mold—and the last one made will be as good as the first. The plaster can be mixed so as to give the maximum strength possible without regard to the mold. It should

FIG. 1—The plasteline figure on a board spread with a thick layer of artists' clay.

FIG. 1

FIG. 2—Cutting a V-shaped groove in the clay flange running all around the figure.

FIG. 2

FIG. 4—The plaster flange is coated with shellac and varnish, then vaseline is brushed in.

FIG. 4

be pointed out here that all materials outside of latex are already available in the plaster casting shop.

Forming the Clay Flange

To form the clay flange, the sculptor first models the original object in plasteline, a composition of clay and lard (or other fatty substances), which remains soft and pliable indefinitely. The plasteline figure is placed on a board on which a thick layer of artists' clay has previously been spread (Fig. 1). The clay is then piled around the plasteline figure in such manner to expose only the front half of the figure. The clay is spread out to a flange extending to approximately two inches around the figure. The flange determines the point at which the subsequent mold will split. It is important that the flange be placed at the widest point extending from the figure and as near to a right angle as possible. The point where the flange touches the figure must be well chosen. A V-shaped groove is then cut into the flange approximately one-quarter of an inch away and running completely around the figure (Fig. 2).

A thin fluid plaster mixture is then applied over both the figure and the clay flange. Care must be taken at this point to break all air bubbles that form as the plaster mixture is applied. As the plaster jells it is built up about an inch high, and when it sets hard the figure is turned over and the clay removed from both the plasteline figure and the plaster flange. The clay removes easily from the plaster. Whatever particles of clay still adhere to the plasteline figure are gently washed off with a soft brush under running water. Care must be exercised at all times not to injure the plasteline figure. An outline of how the plasteline figure sets in the clay flange is seen in Figure 3.

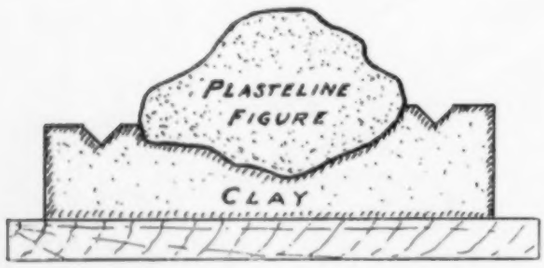


FIG. 3—Outline showing how the plasteline figure sets in the clay flange.

The plaster flange is then given two or three coats of shellac and, when thoroughly dry, a thin coat of sandarac varnish (Fig. 4). Finally, vaseline is brushed well into the plaster flange with a stiff brush. The back part of both the figure and the plaster flange is then covered with the same plaster mixture as was the front part. When this second part of the plaster application has hardened, the completed plaster mold is tapped around the edge until it cracks where the two halves were joined (Fig. 5). The mold is then pulled apart and all traces of plasteline which may have remained are brushed off.

FIG. 5—The plaster mold is tapped around the edges until it cracks where the two halves join.

Plasteline (the material) is then rolled to a thickness of one inch and cut into strips one and one-half inches wide. These strips are placed around the edge of each half of the plaster mold. Strips of burlap, long enough enough to wind twice around the mold and wide enough to cover the combined mold and plasteline, are then

prepared. The burlap strips are soaked in a plaster mixture and wound around the full mold (Fig. 6). When the burlap boxing is hard, the plasteline is removed.

Casting Stone Dies

The burlap boxed molds are now given three thin coats of shellac, and when thoroughly dry, a coat of sandarac varnish. A stiff brush is rubbed on a piece of stearine wax and then rubbed over all parts of the mold. It is very important that a thin coat of stearine covers the entire surface of both the mold and the boxing. The molds are then soaked in water for about thirty minutes. The water is subsequently drained off by turning the mold face downward for ten minutes. The mold is then cast in dental stone. Dental stone is mixed much heavier and for a longer period than plaster. The stone mixture is allowed to flow from one side while the mold is vibrated vigorously. This action brings all air bubbles to the surface.

Dental stone sets very hard in about two hours. When setting begins (in approximately one-half hour) the mold is immersed in cold water and allowed to remain there until setting is completed. When the dental stone has set hard, the burlap boxing is broken off. The plaster is then chipped off with a knife or chisel (Fig. 7). The shellac, sandarac varnish and stearine applications (as described) form a fine separation between the plaster and the dental stone. Extreme care must be taken, however, not to chip the cast stone figure.

At this point we have a front and back half casting of the original figure, each with a flange, with a V-groove in one, and a V-bead in the other. The casts (or molds) are corrected wherever damage may have occurred by patching with plaster, and then allowed to dry for about three days.

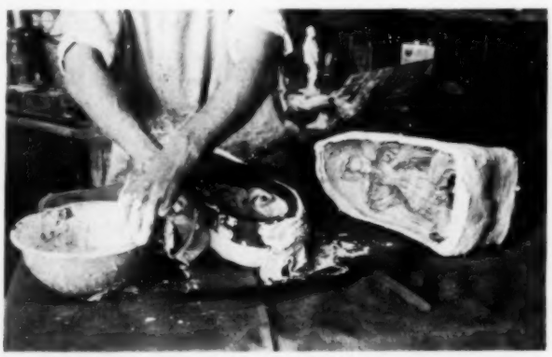


FIG. 6 (above)—Soaking burlap strips in a plaster mixture prior to winding them around the mold to form a burlap boxing.

FIG. 7 (below)—Chipping the plaster off the stone after the boxing has been broken off and after the mold has soaked

FIG. 8 (above)—Applying vulcanized latex over the surface of the stone mold (providing it is no more than 4 inches square).

FIG. 9 (below)—Placing the one-half inch of plasteline over the latex-coated mold, trimmed ¼-inch short all around.

Applying Vulcanized Latex

Vulcanized latex is applied over the entire surface of the stone mold if the subject is no larger than 4 inches square (Fig. 8). The larger the space covered at one time, the greater is the chance of the vulcanized latex shrinking and lifting off the cast. A 4-inch space is not appreciably affected by shrinkage. If the subject to be handled is larger than the 4 inches mentioned, then a 1-inch space is left around each 4-inch space for obvious reasons.

For the first few coats the vulcanized latex must be diluted with a little water and applied very thin. The care in applying the first three coats determines the success of the mold. Air bubbles must be broken up by blowing as each space is coated. The latex should not be rubbed in, but flown with a brush. Additional coatings should not be applied until previous coatings are thoroughly dry. If any minute spaces are not covered with the first or second coats, they should be left alone until the next coat is applied, *i. e.*, no filling in of such spaces should be attempted. The latex coatings dry in approximately 30 to 45 minutes. When all three coats have been applied, then the intervening spaces (between the 4-inch spaces) are also given three thin coats.

With the above method large surfaces can be handled successfully. When the entire surface of the subject is coated with three thin coats of vulcanized latex, four or five heavy coats are applied over the entire surface at one time, allowing each coat to dry thoroughly as before. If the latex mold is to be used for marbelite casting, which is a hot solution, additional coats of vulcanized latex are applied until a thickness of 1/16 to

¼ of an inch is built up, depending on the size of the mold. The plaster shell (described below) is made directly on the latex mold in this case. If the mold is to be used for plaster, artificial stone, or cement, a glue filler can be used.

Vulcanized Latex Models with Glue Filler

When making a vulcanized latex mold with glue filler it is necessary to wait until the eighth coat of latex is thoroughly dry, after which a one-half-inch sheet of plasteline, large enough to cover the mold, is rolled out and placed over the latex-coated mold (Fig. 9). This plasteline covering is trimmed one-quarter of an inch short all around the mold.

A funnel-shaped cone, also made of plasteline, is sealed at one end of the plasteline sheet and a plasteline rod is rolled and cut into lengths. Separate lengths are sealed at opposite ends of the cone. Other lengths of the rod are placed on each high point of the plasteline sheet to act as a vent and thus prevent air from being trapped when the glue is poured. Over this a mixture of plaster is poured, including the edge of the mold, and as it jells it is built up to a thickness of one inch.

This is the plaster shell that will hold the mold, when completed, in position for casting (see Fig. 10). When the plaster shell sets hard, it is lifted and the plasteline removed.

The latex is washed with a sponge, soap and water, and finally sponged thoroughly in clear water. The plaster shell is dried and shellacked over the entire surface with two coats of heavy shellac. When the shellac coatings are dry, the plaster shells are rubbed on their inside surfaces with vaseline, placed back in the latex-coated mold, and tied securely by winding a cord around both mold and die.

Preparing the Composition

The mold is now ready for the glue filler. A composition consisting of one part mold glue, one part gelatine, and one part water, is soaked until it swells. This composition is then heated in a double boiler. One-half part glycerine and one-half part raw linseed oil, by weight, is then added, and the composition is left on the fire for two hours. After this period, the composition is poured through the funnel earlier provided, the pouring continuing until the glue emerges through the vent holes.

It is then allowed to cool overnight. The funnel and vent are subsequently sawed off flush with the plaster shell, and the shell removed, allowing the glue to remain on the mold. The latex edge is washed with a soapy cloth, and then repeatedly wiped off with a wet cloth to remove all traces of the soap. While washing this edge, as little water as possible must be allowed to get into the glue. A few hours must be allowed for the water (from washing) to evaporate from the glue.

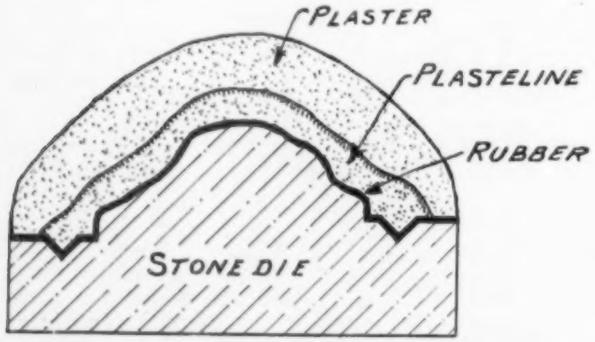


FIG. 10—Drawing of the plaster shell which holds the mold in position for casting when the mold is completed.

FIG. 11 (above)—Process of casting in the mold, to the right of which is seen several completed figures.

FIG. 12 (below)—A finished cast product on both sides of which are seen the two halves of the latex mold.

The glue is then covered with three heavy coats of vulcanized latex, each coat being allowed to extend over the glue to the latex edge. This action seals the glue into a seamless shell of latex, and makes the mold waterproof. The finished mold can then be washed in cold water without fear of injuring it. Any heat generated by plaster, dental stone or cement casting material will not affect this mold. A rinsing of the mold in cold water between each casting is all that is required. Figure 11 shows the process of casting in the mold. Figure 12 shows a finished product as it emerges from such molds.

Molds for Plaques—Flat Work

To make molds for plaques—generally referred to as flat work—the plaque is placed on a smooth plywood board that has previously been given a thick coat of shellac. A wooden frame, wide enough to allow a one-inch clearance all around the plaque and which is one inch larger than the plaque itself, is placed on the board.

The crevices between the model and the plywood are filled with plasteline. Three thin coats and four heavy coats of vulcanized latex are then applied, as hereinbefore described. Glue is melted and poured in the frame. When the glue chills, it is covered with three heavy coats of vulcanized latex. A few hours are allowed for this last latex coating to dry. The framework and plaque model are then removed, and the mold is ready for casting.

An index to Volume 41 of THE RUBBER AGE will be found facing page 74 of this issue.

X-Ray Diffraction Patterns
of Sol, Gel, and Total Rubber when Stretched, and when Crystallized by Freezing and from Solutions

By George L. Clark[1], Enno Wolthuis[2], and W. Harold Smith[2A]

I. Introduction

WHEN unstretched rubber is examined by X-rays, it produces a blurred ring, the halo which is typical of the amorphous or liquid state. Its behavior when stretched was first reported by Katz,[3] who observed interference spots at 80 per cent elongation. Their intensity increased with increasing elongation and at 400 per cent a definite fiber diagram was observed. Consequently, rubber, when extended, was considered to be crystalline, and the Joule effect to result from an actual formation of crystals. When Katz heated stretched rubber, the interference spots vanished. Vulcanized rubber produced interferences, but the spots were weaker than those obtained with unvulcanized rubber. The identity period along the direction of stretch was 8 A and the dimensions assigned to the unit cell were 8×6.5×6.5 A, with a volume of 338 A^3.

The behavior of stretched rubber between 80 and 1,000 per cent elongations was investigated by Hauser and Mark,[4] who made a more accurate study of the positions and intensities of the interferences. The positions of the interferences were found to be independent of the degree of stretching, but their intensities increased porportionally with it. The position of the amorphous ring remained unchanged during extension, but its intensity decreased with continued elongation. Therefore, an amorphous or liquid phase in unstretched rubber was supposed to be changed to a crystalline phase when it was stretched. The positions of the interferences, which depend on the dimensions of the unit cell, did not change with continued stretch and consequently a definite space lattice was indicated.

Other evidence showed that new crystalline units were constantly produced during elongation, and that the major axis of the crystalline phase was oriented parallel to the direction of stretch. The interferences in stretched rubber disappeared at 60° C. When rubber was maintained in an extended condition for some time, the interference spots vanished. If rubber was milled or swollen by solvents before stretching, the interference spots did not appear. An orthorhombic configuration was assigned to the unit cell, but the possibility of a monoclinic structure was admitted. Its dimensions, 8.0×8.6×7.68 A, correspond to a cell volume of 529 A^3. There were 4.12 molecules of C_5H_8 per unit cell.

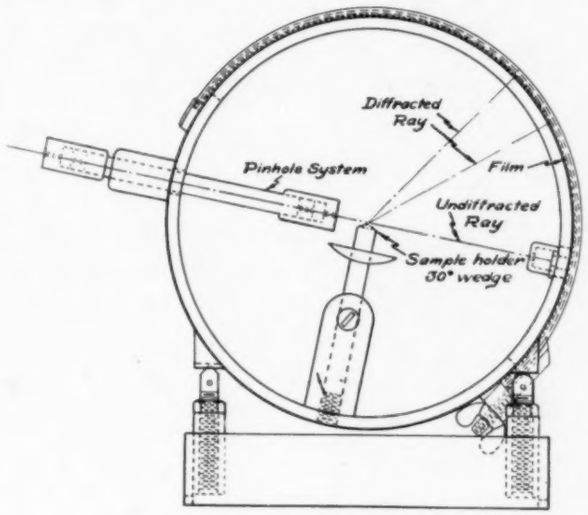


FIG. 1—Cylindrical Camera

The interferences obtained by Mark and von Susich[5] were better defined, and better measurements were possible. A rhombic cell was assumed and the dimensions given to it were 8.3×8.1×12.3 A ±0.1 A. The volume of the unit cell was reported to be 830±30 A^3, with 7.1 molecules and not 8, presumably because of poor density values. With the Weissenberg apparatus, Mark and von Susich proved that the indices (111) and (200) of Hauser and Mark are really (100) and (010). They observed that very thin specimens of rubber showed fibering and also three-dimensional orientation. So a distribution of carbon atoms was proposed which aims to reconcile the orientation of the primary valence chains in the direction of stretch, atomic spacings for single and double-linked carbon atoms, and the observed intensities. By topochemical reactions, they attempted to convert stretched rubber into derivatives retaining the structure, but X-ray patterns of the derivatives indicated an amorphous condition.

On the basis of a single experiment, Ott[6] assigned a volume of 259 A^3 to the largest possible cell. Using the values of Bragg for the radius of carbon, 0.77 A, and of hydrogen, 0.73 A, and assuming close packing, the volume of C_5H_8 was computed to be 43.1×10^{-24} ml or 43.1 A^3. On these assumptions, the maximum number of C_5H_8 groups in Ott's cell is six.

A recent paper by Lotmar and Meyer[7] reports accurate measurements of the structure of crystallized rubber. The unit cell was derived by the graphical

NOTE: This article is appearing simultaneously in the October issue of the *Journal of Research*, published by the National Bureau of Standards.

(1) Professor, University of Illinois.
(2) Graduate Student, University of Illinois. A part of the material in this paper was presented as a thesis by Enno Wolthuis in May, 1937, to the Faculty of the Graduate School of the University of Illinois, represented by Dr. George L. Clark, in partial fulfillment of the requirements for the degree of Doctor of Philosophy.
(2A) National Bureau of Standards.

(3) L. R. Katz, *Kolloid Z.* **36**, 300; **37**, 19 (1925).
(4) E. A. Hauser and H. Mark, *Kolloidchem. Beihefte* **22**, 63 (1926).
(5) H. Mark and G. von Susich, *Kolloid Z.* **46**, 11 (1928).
(6) E. Ott, *Naturwissenschaften* **14**, 320 (1926).
(7) W. Lotmar and K. H. Meyer, *Monatsh.* **69**, 115 (1936).

method of Sauter, is monoclinic, and has the following axes:

$a = 8.54 \pm 0.05$ A
$b = 8.20 \pm 0.05$ A (fiber axis)
$c = 12.65 \pm 0.05$ A
$\beta = 83°20'$
Volume of unit cell = 880 A^3, approximately.

They report 7.6 molecules per unit cell and this value is based on the highest value of density, 0.965, reported in the literature.[8] Eight molecules are assumed to be present. By an elimination of possible space groups, there remains the probable one, C^5_{2h}, and the chains are presumed to have the symmetry of a two-fold screw axis. The crystallite is said to be a molecular racemate of right and left spiral molecules.

Subsequent to the work of Lotmar and Meyer, Barnes[9] examined two samples of frozen crude rubber, one of which had remained frozen for 22 years, and the other for at least 11 and probably for 30 years. They lost their opacity at approximately 41°C. The measurements of Barnes agree excellently with those reported by Lotmar and Meyer for stretched rubber. Identical patterns were obtained from each specimen.

Crystal interferences in frozen, unstretched smoked sheet were found by Hauser and Rosbaud.[10] They were indicated by Debye-Scherrer rings. Later, von Susich[11] constructed a melting curve from the behavior of patterns of frozen rubber at different temperatures. With unstretched rubber, the powder pattern disappeared completely at approximately 35°C., and with stretched rubber at about 90°C. Above 90°C. the pattern was that of an amorphous material. Indices were assigned to four rings in the frozen-rubber pattern, but no spacings or calculations were mentioned.

In the present investigation the work of Lotmar and Meyer is checked with stretched gel rubber, which yields a sharper and more intense diffractive pattern than is obtained with the total rubber. The powder patterns of frozen sol, gel, and total rubbers are compared as to their interplanar spacing and the intensity of their interferences, and an examination is made of the sol and gel fractions crystallized from an ethereal solution at low temperature.

(8) H. Mark and G. von Susich, footnote 5.
(9) William H. Barnes, *Can. J. Research* **15**, 156 (1937).
(10) E. A. Hauser and P. Rosbaud, *Kautschuk* **3**, 17 (1927).
(11) G. von Susich, *Naturwissenschaften* **18**, 915 (1930).
(12) W. Harold Smith, Charles Proffer Saylor, and Henry J. Wing, *J. Research* **10**, 479 (1933). W. Harold Smith and Charles Proffer Saylor, *J. Research* **13**, 453 (1934).

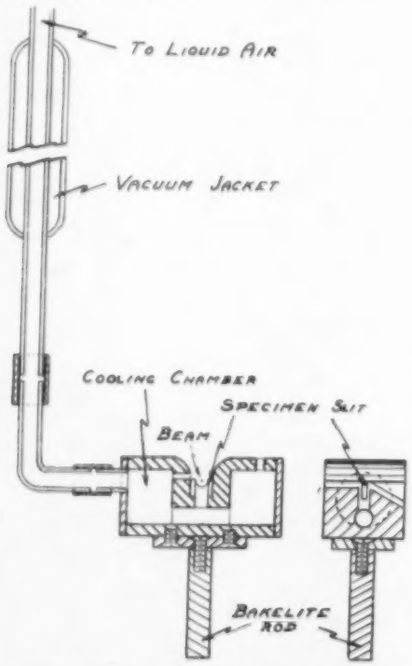


FIG. 2—Low-Temperature Specimen Holder

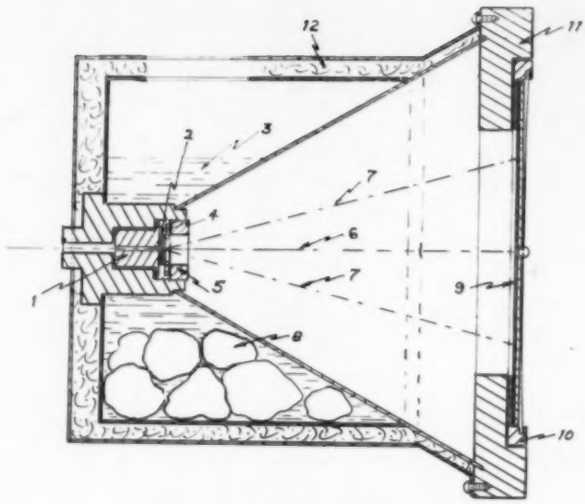


FIG. 3—Low-Temperature X-Ray Camera
1. Pin-hole; 2. Specimen; 3. Acetone; 4. Aluminum Washer; 5. Threaded Washer; 6. Undiffracted Ray; 7. Diffracted Ray; 8. Dry Ice; 9. Film; 10. Film Holder; 11. Wood Frame; 12. Insulation.

II. Materials and Methods

The rubber hydrocarbon used in this investigation was obtained from the latex of *Hevea brasiliensis*, the source of the principal rubber of commerce. It was prepared at the National Bureau of Standards from latex supplied by the United States Department of Agriculture, and was studied by X-rays at the University of Illinois.

The preparation of pure sol, gel, and total rubber hydrocarbons, and the formation of discrete crystals of sol and gel rubber from solution, have been discussed in another scientific journal.[12] Similar material was used in this investigation. The rubber was purified and separated into sol and gel fractions under conditions which aimed to preserve its structure and to avoid the effects of light and of oxygen. Oxidation of the rubber was minimized by allowing it to remain in contact with the natural antioxidants which are in crude Hevea rubber, until the final stage of purification. At low temperatures the hydrocarbons in massive rubber crystallize without a solvent. Specimens of "frozen" sol and gel were prepared by maintaining the samples at —25°C. for 30 days. Other specimens of crystalline sol and gel rubber were prepared at low temperatures from ethereal solutions of the fractions.

The production of a diffraction pattern by stretched rubber, and the changes which occur when unstretched rubber is frozen and when it separates from an ethereal solution at low temperatures as discrete particles have been repeatedly termed crystallization, and that word will be used in this paper.

In the application of the ordinary X-ray diffraction equipment and technique there is no resolution of interferences which correspond to the very long interplanar spacings which frequently exist in natural materials. Hence, special apparatus and methods have been developed in the X-ray laboratory of the University of Illinois, in which a magnetic field is used to deflect the scattered electrons which ordinarily fog the film. Definite and reproducible evidence has been obtained

TABLE 1.—X-RAY DIFFRACTION DATA FOR STRETCHED GEL RUBBER; SEE FIGURE 5

Flat-film camera. Distance from specimen to film 5 cm.

Pattern	Equator			First layer line			Second layer line		
	R	θ	d	R	θ	d	R	θ	d
	cm		A	cm		A	cm		A
R-57	1.26	7°4.34′	6.24	.....	.....	.....	1.98	10°48.1′	4.102
	1.925	10°31.41′	4.21	.....	.....	.....	.....	.....	.....
R-61	1.258	7°3.68′	6.253	1.60	8°52.34′	4.983	2.435	12°59′	3.421
	1.925	10°31.7′	4.207	2.20	11°52.5′	3.735	.....	.....	.....
	2.738	14°21.17′	3.100	2.44	13°0.4′	3.41	.....	.....	.....
R-62	1.26	7°4.33′	6.243	1.62	8°58.56′	4.926	1.99	10°51.1′	4.082
	1.94	10°36.19′	4.177	2.215	11°56.8′	3.714	2.47?	.....	.....
	2.755	14°25.64′	3.084	2.44	13°0.375′	3.412	.....	.....	.....

of very large spacings in collagen, gelatin, keratin, and other materials, including gel rubber.

For the work with stretched gel rubber an ordinary flat-film camera was used. The distance from specimen to film was 5 cm. For the work with frozen sol, gel, and total rubbers, and rubber crystals deposited from solution, special apparatus and technique were again required to obtain the diffraction patterns at temperatures below the melting point of the crystals.

The crystallized rubber specimens were examined by two specially constructed types of cameras. One was a cylindrical camera, shown in Figure 1, in which a low-temperature specimen holder, pictured in Figure 2, was inserted in place of the wedge sample holder used for powder specimens. The entire holder was cooled by the exhaust from a liquid-air reservoir, and the cold air passed out alongside the specimen. The sides of the cylindrical camera were closed to prevent condensation of moisture on the specimen. The air in the camera was readily precooled by placing solid carbon dioxide within it. The other low-temperature camera is shown in Figure 3, and had the advantage of a longer distance from specimen to film for the accurate determination of the longer spacings. It consisted simply of a funnel, in the apex of which was situated the pinhole and specimen, the latter held in place with aluminum washers. Cooling was accomplished by means of solid carbon dioxide and acetone. The open end of the funnel was fastened to a wooden frame which held a flat film. The collimator (not shown in the drawing) which defined the beam of X-rays, and which touched the camera, was constructed of wood to prevent the condensation of moisture upon it and to avoid the conduction of heat to the specimen.

In all X-ray investigations of rubber we have employed the copper K radiation from a Philips Metalix tube operating at 26 kv and 22 ma.

Sodium chloride was used as a standard in the calibration of the cylindrical camera. The distance from specimen to film was found to be 6.33 cm. Exposures for frozen rubber usually required from 5 to 10 hours.

The calibration of the low temperature flat-film camera was determined indirectly because of the difficulty in obtaining a reliable long-spacing standard. Previous work with sucrose in a calibrated camera had shown this material to be an unreliable standard for long spacings. At least the spacings do not agree with those of Becker and Rose.[13] We consider the cylindrical camera radius, as calibrated with sodium chloride, to be more reliable than the sucrose data. Hence, the sucrose spacings were calculated from the pattern obtained in the calibrated, cylindrical camera, the radii of the corresponding lines on the flat film were noted, and the distance from specimen to film of the flat-film camera was estimated to be 10.32 cm.

III. Experimental Results

1. BEHAVIOR OF SOL, GEL, AND TOTAL RUBBER WHEN STRETCHED

It is customary to consider the diffraction pattern which is obtained with stretched rubber as characteristic of the entire rubber hydrocarbon. This was found not to be the case, when the sol and gel fractions which have been used in the present work were examined separately. The original observations were reported briefly by Clark, Warren, and Smith,[14] and since that report they have been confirmed.

When stretched, at room temperature, the purified total rubber hydrocarbon behaved exactly like any specimen of whole rubber, and produced a similar crystal fiber diffraction pattern.

The sol rubber fraction produced no evidence whatever of the characteristic crystal fiber pattern when stretched even at 1,000 per cent elongation. The liquid halo was retained at all elongations, but it became *broader* in proportion to the increased percentage of stretch. This may be caused by decreasing particle size.

(13) K. Becker, and H. Rose, *Z. physik* **14**, 369 (1923).
(14) Geo. L. Clark, W. J. Warren, and W. Harold Smith, *Science* **79**, 433 (1934).

TABLE 2.—X-RAY DIFFRACTION DATA FOR STRETCHED GEL RUBBER; SEE FIGURE 6

Flat-film camera. Distance from specimen to film 5.09 cm. Pattern *R*64 (with NaCl).

Equator			First layer line			Second layer line		
R (cm)	θ	d	R (cm)	θ	d	R (cm)	θ	d
		A			A			A
1.27	7°0.3′	6.30	0.87	4°51′	9.09	2.00	10°44′	4.13
1.95	10°29′	4.23	1.63	8°53′	4.98	2.46	12°54′	3.45
2.76	14°14′	3.13	2.22	11°47′	3.76	.....	.....	.....
			2.47	12°57′	3.43	.....	.....	.....

The same results were observed in the presence or absence of antioxidants.

When elongated 100 per cent or more, the gel fraction produced the characteristic crystal fiber pattern. At 200 per cent elongation the pattern was quite sharp and intense. The liquid halo remained unchanged in width but decreased in intensity as the crystal interferences increased in intensity. When, however, antioxidants were removed and the gel rubber was exposed to air for some time in the unvulcanized condition, it was difficult to find crystal interferences, even at 400 per cent elongation.

Samples of sol and gel rubber were vulcanized by the Peachey process. In this method, active sulphur is formed at room temperatures by the reaction between hydrogen sulphide and sulphur dioxide. Vulcanized sol rubber began to show faint evidence of crystal interferences when stretched more than 400 per cent, which showed that sulphur had produced a profound structural effect. Vulcanized gel rubber produced a fiber pattern, but not at elongations less than 250 per cent.

Differences in the physical properties of sol and gel rubber are indicated by their stress-strain behavior, when vulcanized.[15] The unvulcanized gel fraction, when milled, is the more difficult to "break down" or plasticize. The gel has much greater stiffness and more perfect elasticity; the sol is softer, more extensible, and when deformed takes a permanent set.[16] The sol fraction is the more mobile of the two. For that reason, crystals which may be formed when sol rubber is stretched probably melt quickly and a diffraction pattern cannot be obtained. If successive strips of it were stretched, immediately before they were passed through an X-ray beam, evidence of crystallinity might be produced.

Pummerer[17] separated total rubber into sol and gel by a modification of Feuchter's[18] diffusion method, which differs from that used in the present study. Each of the fractions which he obtained produced a diffraction pattern when stretched. Subsequently, Hauser[19] observed that rubber when extended very slowly, that is, isothermally, produced no interference.

(15) W. Harold Smith and William L. Holt, *J. Research* **13**, 465 (1934).
(16) See footnote 12.
(17) R. Pummerer, *Kautschuk* **2**, 85 (1926).
(18) H. Feuchter, *Kolloidchem. Beihefte* **20**, 434 (1925).
(19) M. Hunemörder and P. Rosbaud, *Kautschuk* **3**, 228 (1927).
(20) Geo. L. Clark, *The Rubber Age (N.Y.)* **38**, 79 (1935).

Fig. 4—Long Spacing in Unstretched Gel
Room temperature. Exposure 18½ hours.

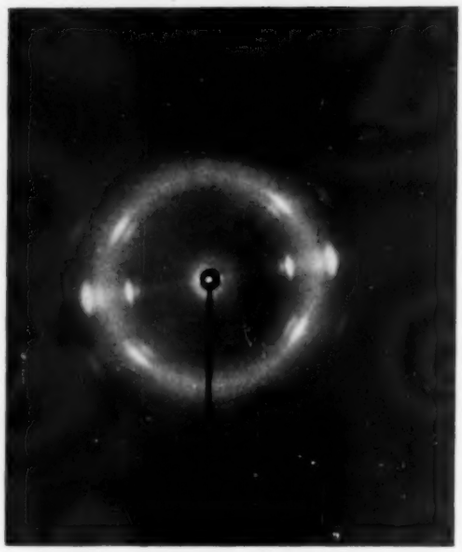


Fig. 5—Pattern *R57*
Gel without sodium chloride. Stretched about 500%. Fiber axis normal to beam. Room temperature. Exposure 6 hours.

2. LARGE INTERPLANAR SPACING IN GEL RUBBER

When unstretched gel rubber is examined with the equipment for detecting and measuring the very long interplanar spacings, there appears a ring of small diameter with arcs which indicate fibering. (See Fig. 4.) It corresponds to a spacing of 54 A, or a multiple of this value, instead of 58 A, as previously reported.[20] When gel rubber is stretched, these arcs condense into very sharp equatorial spots, corresponding to this periodicity. There is a lateral separation of molecules or crystallites of 54 A, or perhaps a multiple of it, which persists in stretched gel rubber with the fibering. An examination of sol rubber indicated that no such spacing was present. It was reinvestigated under conditions which were carefully controlled, but no evidence of large spacing interference was produced by the sol phase.

3. DIFFRACTION PATTERNS OF STRETCHED GEL RUBBER

The gel rubber, when stretched nearly to the breaking point, produced an intense diffraction pattern which was sharper than that obtained with total rubber. The diffraction data are given in Tables 1 and 2. In these tables, and in those to follow, d is the distance between the set of planes, making an angle θ with the incident beam. R is radius of the diffraction spot or ring as measured on a flat film. L is the distance on the film from the diffraction line to the central spot when the cylindrical camera is used. When symbols are used to indicate relative intensities, they have the following conventional designations: *s*, strong; *m*, medium; *w*, weak; and *v*, very weak.

The data in Table 2 are assumed to be more reliable than the data in Table 1, because the distance from specimen to film was more accurately determined in this case by covering the sample with finely powdered sodium chloride. The results are in very good agreement with those of Lotmar and Meyer, as shown later in Table 5. In view of the broad interferences in the pattern used by Lotmar and Meyer, it is surprising that the agreement is so good.

(To be concluded in the next issue)

INSTRUMENTATION in the Manufacture of Tires

New Automatic Control of Vulcanization Adopted by Foreign Tire Manufacturer with American Instruments

By Reginald Trautschold, M.E.

ONE of the large manufacturers of automobile tires abroad has turned to automatic control of vulcanizing in a really big way—so that temperature, pressure, time and the inter-relation of one to the other, the interlocking coordination of critical operation and the conditions under which they are consummated, are exactly the same during each cycle of fabrication. As a result, unsurpassed uniformity in product quality is secured and wastes of all descriptions are reduced to minima, with no interruptions or time out to curtail output and pile-up expenses.

In short, manufacturing costs for superior tires have been pared to the bone—and this in a locality where rubber is cheap and plentiful and where labor costs are low—by adopting American methods of coordinated process control and installing American-built instruments of clock-like precision. It behooves the American tire producer to take heed.

Coordinated Process Control

The instrument board, shown as it was erected prior to shipment abroad (Fig. 1) consists of a main panel and eight similar operating panels installed in two sections, one section consisting of the main recording instrument panel and the first four of the operating panels and the other, facing the first section, made up of operating panels Nos. 5, 6, 7 and 8. The recording instruments on the main panel maintain (on slowly rotating charts) continuous registers of (1) air pressure used to inflate the tire bags; (2) high and low hydraulic pressure on the autoclaves, posted on the one chart; and (3) steam pressure used to heat the tires in the autoclaves.

The operating panels each carry four indicating instruments, the upper two being duplicate steam gauges for showing the steam pressure within the autoclave (see Fig. 2). The gauge furthest to the left on each operating panel posts the air pressure used to inflate the tire bag, and that furthest to the right indicates the hydraulic pressure applied to the autoclave. Above the latter two instruments, and flanking the steam gauges, are light signals, a red lamp on the left, which burns when the steam is on the autoclave, and a blue lamp to the right, which burns only when the blow-off valve is open.

The central recording instrument is a thermometer which maintains an uninterrupted register of the temperature within the autoclave, posting the temperatures during the heating-up period, which customarily takes half an hour; of the "hold", lasting an hour and a half; and of the drop on the completion of the cure. The accurate control of these critical temperatures, and the sensitive timing of their occurrence, are governed by the cam-operated time-temperature-controller instrument situated on the panel below the recording thermometer. The actuating cam-shaft of this controller rotates during the curing period once in six hours and is provided with three control cams for cure periods of 260, 275 and 290 minutes respectively, while a micrometer screw adjustment permits varying the cure temperature 10 degrees one way or the other.

Pilot Valve Manipulation

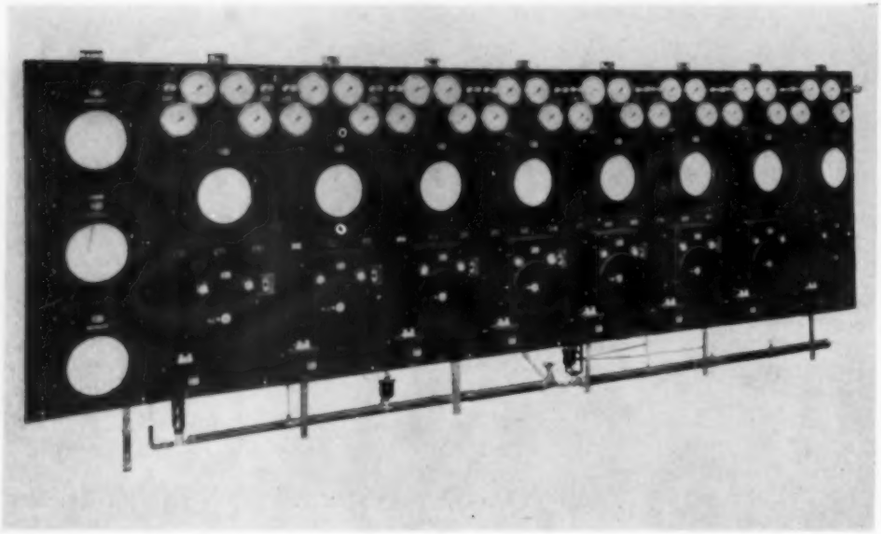
Adjustable cam segments, which manipulate the pilot valves regulating the admission of steam and of the compressed air, used as the operating medium, govern the temperature rise and the "hold", so that the heating-up period may be varied from half an hour duration to as much as an hour and a half, and the duration of the cure temperature "hold" set at from an hour and a half to four hours and a half. The time-temperature-controller also governs the condensate operation, in which the temperature settings at which the pilot valves function are 6 to 8 degrees below that of the steam inlet point. Here again micrometer adjustment furnishes plus and minus regulation 10 degrees either side of the setting point.

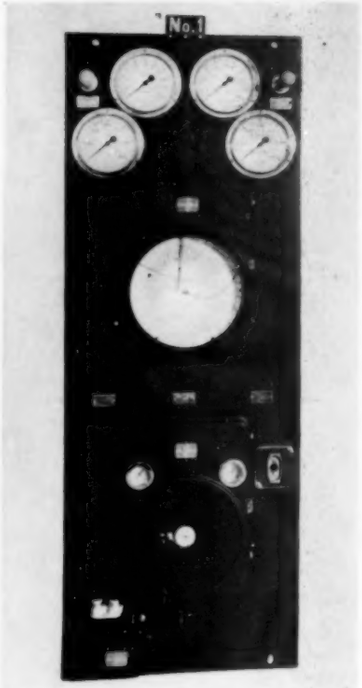
The three-way pilot valves, used in both the steam inlet and condensate controls, are manipulated by cam followers which ride the control cams and drop at the end of the cure period, the drop effecting a change in driving gears which speeds-up the rotation of the cam-shaft some fifteen times and brings the cam follower to its starting position, or point, within 20 minutes. This interval is less than the time required to unload and recharge the autoclave, so when the cam follower, upon its return to the starting point, is picked up by the still rotating cam, the actuating telechron motor circuit opens and stops further cam movement.

To restart the press for another automatic cure, after reloading the autoclave and making the customary air bag test, as on the initial run, the operator has simply to depress the starting button at the side of the time-temperature-controller. The two relays at the lower left corner of the operating panel are thereby brought into operation, one of the air valves on the relay case feeding air to the blow-off valve, closing it, and the other feeding air to the time-temperature-controller, which governs the steam inlet and condensate valves, as per control cam settings. The relays also close a holding contact, and as the steam is admitted to the autoclave the red signal light comes on, and the blue light, which burns only with the relays open, goes out, and the functioning telechron motor starts up.

FIG. 1 (below)—Recording and controlling instrument board assembled on test floor at the factory. FIG. 2 (right)—A close-up of Operating Panel No. 1.

(Photos by courtesy of the Bristol Co.)





Automatic Control

As the compressed air is admitted to the time-temperature-controller, a pneumatic bellows comes into play and causes the gears, which drive the cam shaft at one-sixth revolution per hour, to engage. The cam follower is thereupon raised by the heating-up portion of the slowly rotating control cam segment, bringing the autoclave to heat according to the definite set and timed temperature schedule; then the flat of the control cam adjusts the admission of steam so as to maintain the top heat for the duration of the cure period, after which the follower drops off the control cam and opens the relay holding circuit.

As the relays are thus cut out, the compressed air holding the blow-off valve closed is released and the air pressure removed from the controller, causing both the steam inlet and condensate valves to close, while the blow-off valve opens. At the same time the air pressure is removed from the pneumatic switch, disengaging the slow motion driving gears and engaging the high speed gears which carry the cam follower to its position for starting the next tire vulcanizing cycle.

The commencement and duration of this condensate control, started by the opening of the relay holding circuit, is signaled by the red light going out and the blue light burning until the starting button is pressed for the commencement of the next cure.

Air Bag Tests and Cures

Before the starting of a cure, tests are conducted by hand valve manipulation to ascertain whether the air bag leaks. For this purpose provisions are made on each of the operating panels for the connection of the necessary valves and the utilization of the indicating gauge on the left of the panel for registering pressure findings, as shown by the three outlets between the recording thermometer and the time-temperature-controller instruments. The tests are made by a valve connected to the middle outlet, the right hand connection being used for the actual inflation of the air bag and that to the left for bag deflation.

For air bag cures, as they may be required, a cycle controller similar to that governing the tire curing cycle, but functioning on a twenty or thirty minute cam rotation period, is mounted on the respective operating panels on the lower right hand corner. In the operation of this automatic control, the first step consists of feeding compressed air to open a diaphragm steam valve and close an air control valve. Ten minutes later, the cycle controller automatically closes a pneumatic switch, energizing the relays in the relay box and starting the time-temperature-controller functioning. Five, six or seven minutes earlier the air valve on the cycle controller has closed, cutting-off the air from the steam admission valve, closing it, and releasing the pressure holding the air control valve closed, opening it.

Completing the Air Bag Process

At the end of the set run of the time-temperature-controller of twenty minute duration, during which interval the air bag cure with its established temperature rise and "hold" at cure heat occurs, substantially as in the vulcanizing of tires, the relay circuit is cut, completing the air bag processing.

The mechanisms employed in effecting this automatic air bag cure, if and when necessary, are ingeniously designed to avoid dangers of excessive drag on the control cam, undue strain on the gearing, and possible reversal of cam follower movement. But these, and the many other mechanical refinements which now coordinate process control in tire manufacture, need not be enlarged upon. They represent advance of the highest order in those automatic controls which have now brought quality tires into the world market at unprecedented low prices. Further instrumentation, brought about by trial-and-error proceedings, will probably lower these prices still more.

An index to Volume 41 of THE RUBBER AGE will be found facing page 74 of this issue. Indexes to Volumes 39 and 40 appeared in the April, 1937, issue.

Rubber Plates and Graphic Arts

A History of the Development and Use of Rubber Plates Together with a Discussion of Their Proper Manufacture

By J. B. Shaughnessy
Rubber Printing Products Div., American Wringer Co.

MANY YEARS AGO, progressive printers realized that letter-press printing had its limitations and set about to make them more elastic. When elasticity entered their minds, rubber immediately followed. They took old offset blankets, glued them to wood blocks, and made tint blocks or engraved simple designs or patterns on them. This was the start of the rubber-printing-plate idea.

This crude form of rubber plate enabled them to obtain effects that had previously been thought impossible. Rubber stamps were then tried to further this end. Unfortunately, inaccuracies in thickness regardless of the care taken by the stamp manufacturers prevented their use. Some of these rubber stamps failed after only a few thousand impressions, because the rubber lacked oil resistance. The rubber-plate idea was discarded. At that time, the causes were never investigated or considered, the thought being, and truly enough, that they were "no good."

Then came the rubber water-color age and rubber plates flourished. Beautiful effects were obtained from crude hand-engraved plates in conjunction with water-soluble inks. Large establishments clamored for licenses at a high price to allow them to use a process embodying rubber plates. However, most license arrangements are comparatively short-lived, and the expensive process was dropped. Many were thoroughly disgusted, for they had taken the rubber printing plate intended for water-color inks and endeavored to use this type of rubber compound with oil inks, which deteriorated the rubber and caused plate failure.

Renaissance of Rubber Printing Plates

About five years ago the rubber plate idea again came to the fore. Many rubber companies advertised "oil-proof rubber" but the plate buyer, although he knew its applications and uses, was by this time skeptical. However, the rubber companies with their vast resources for chemical research were active by this time and set about perfecting a compound that would resist abrasion and also oxidation by the ingredients in average oil inks and that could be handled by the average plate manufacturer in a vulcanizer as well as by the engraver of simple and crude designs, tint blocks, and similar decorative effects.

This idea has progressed and has resulted in improvements, almost day by day. Only five years ago, ten thousand impressions were considered rather fine from the standpoint of plate life, whereas today printers complain of only getting one hundred thousand impressions, and runs of a million are not uncommon.

Let us consider this enthusiasm and find the reasons for the interest in rubber plates. Why should anyone want a rubber plate? A metal plate was serving the purpose; and did a real reason exist for making any changes? This, of course, was easily explained because only coated papers were used for the majority of printing jobs and, as a matter of fact, it was the only paper that the average printer knew how to print on and that could be successfully printed in letter-press. When antique finishes, offsets, laids, and other rough stocks were suggested, the printer threw up his hands or tried to "unsell" the customer on their use.

Rubber printing plates are now being manufactured commercially for all classes of work. They have been found to be particularly suitable for use on cover stock, embossed papers of all types, handmade finishes, glassine, cellophane, celluloid, metallic papers and cloth, glass, tin, and other surfaces that ordinarily cannot be printed from metal plates or where perfect coverage without mottle and the minimum quantity of ink are essentials. Many offset houses having letter-presses are using rubber plates and are selling printing from them that cannot be distinguished from offset by the average printer. Short runs in offset are not practical and are costly.

Any type of ink can be used on these plates. However, those containing chemicals that are rubber solvents are, of course, most harmful as an oil-proof plate does not exist. All rubber when it comes in contact with a rubber solvent has a tendency to swell. Swelling gives over-impression and results in plate failure.

Many and Varied Applications

Molded rubber printing plates can be made and mounted on various kinds of metal or patent base, curved for rotary presses, or blocked type-high for locking in a chase. The newer type of plate now being used on rotary presses is an adhesive-backed plate. It is mounted on a smooth cylinder or on a saddle that has previously been affixed to the cylinder and can be mounted or removed in less than a minute's time.

Rubber manufacturers have gone far toward making a good rubber compound for manufacturing a printing plate. However, ink companies have not been able, thus far, to perfect an ink that will not affect rubber plates materially. They, of course, are limited to varnishes, all of which affect rubber to a degree, some more than others, the oils in the varnishes having the same origin as the rubber—both vegetable.

Multigraph printing is becoming popular, not only for straight type work but also for line cuts, and Ben Days in two or three colors are being printed successfully from rubber plates. Exceptionally long runs,

This paper was presented at the Graphic Arts Technical Conference, held on May 6-8, in New York City, and is appearing simultaneously in the October issue of *Mechanical Engineering*, journal of the American Society of Mechanical Engineers.

many over a million, have been reported. Due to elasticity of the rubber, half tones have not been entirely successful. However, newspaper screens and those up to 85-line have been done with fair success. The ordinary 65-line screen when printed from rubber appears to be between 85 and 100 and an 85-line screen takes on the appearance of 120 to 133. This, of course, is only an optical illusion brought about by the impression on the dots which closes them and spreads the dots slightly. Half tones from rubber do not have the values that can be obtained from the metal plate on coated paper but, with stocks on which no printer would attempt to print half tones, a rubber plate can produce a commendable job.

Advertisers in general can effect great savings, due to the fact that one metal key plate can be made and color separation obtained from this plate and an original color drawing. The remainder of the colors are hand-engraved. The metal key plate is, of course, molded into a rubber plate and generally carries the burden of detail. Many effective advertising pieces have been done in this manner with savings of $200 to $300. In general, they are run in conjunction with a campaign and never used again. Therefore, nothing is to be gained by saving the original plates and the rubber plate serves its purpose. It can be used again if stored away from light and heat and can be kept for three or four years if proper care is taken of it.

Printing of a rubber plate requires a certain degree of skill. A kiss impression on the sheet, lightest possible roller setting, and a soft ink are used. Wherever possible, make-ready is accomplished through underlays and, if necessary to put patches under the tympan, they should be buried as deep or as close to the metal as possible.

Transfer Determines Quality of Plate

Rubber printing plates are manufactured in several different ways, the original method being hand engraving. As a first step, the rubber is cut to the desired size for the plate, an allowance of ¼ inch on each side being made for tacking to a block or beveling for patent base.

If the copy is a sketch, a tracing is made on paper that does not stretch or wrinkle. A 3 H pencil is used as this pencil keeps a point and yet deposits enough graphite on the paper to transfer to the rubber. After the tracing has been made, the paper is placed, drawing side down, on the rubber in the proper position and held by a weight so it will not shift. The engraver then rubs the tracing down onto the rubber with a blunt stick or other type of material that is smooth and round and will not have an abrasive or sticking action on the tracing paper. He carefully rubs along each line that is to be used as a guide in cutting the rubber. The paper must not wrinkle or stretch because, for a two- or three-color job, the same tracing is used once for each color which is cut by the engraver on its individual plate, and, if the paper stretched, the plates would not register. Great care must be exercised in this operation, as the success of a plate depends on the proper transfer from the original.

Where a metal plate or type is used as copy, it is inked with ordinary printing ink and a proof taken on "glassine" paper and the transfer made from the proof, as it would be from a tracing. Glassine is used because ink will not dry as readily on this paper and no detail is lost, while if ordinary paper is used, the ink strikes into the sheet and part of copy will not transfer. If the artist draws on the rubber direct, he must be careful to draw and letter backward, so that when the plate is used for printing, it will print to read correctly.

A large plate or one having considerable detail presents the hazard of the engraver rubbing or slurring his transfer with his hands while engraving. The best way to avoid this is to spray or brush a thin coat of clear shellac over the entire plate before engraving, and, when the plate is completed, the shellac can be washed off with alcohol. If the transfer is made from a proof, the transfer should be powdered with talc to prevent slurring.

Engraving and Stripping Require Skill

The plate is now ready to engrave. The engraver uses a regular "Gillette" knife that is made for this purpose. Special blades are also sold, but the Schick razor blade is superior and holds an edge much longer. It is ground on one end to fit the holder and sharpened with a single bevel, like a wood chisel, at an angle of about 30°. The knife is held in the right hand like a pen and is always pushed away from the engraver. In this way, he can always keep the knife on the line along which he is cutting and thus cut the rubber with the proper bevel.

Rubber should always be cut with the bottom of the image wider than the top. If rubber is cut square or undercut, which is the tendency when pulling a knife, the image will not have any support on the edge and will have a feathery appearance when printed. The engraver can always feel the fabric when pushing a knife and he should try to avoid cutting the fabric while engraving. Lines should be cut with a straight edge by pulling the knife toward the engraver, but care must be taken to keep the proper bevel which should be 60° and never less than 70°. The plate is moved to the knife rather than the knife to the plate.

No stripping is done until the entire plate has been engraved. This is most important because the rubber on the plate supports itself and keeps the lines accurate and prevents stretch of the rubber at the time of cutting. After the entire plate has been engraved, the engraver takes his knife and cuts down through the fabric to the metal in the large areas to be removed and removes the rubber from the metal with his fine-pointed pliers, a pair of so-called alligator or long-nosed pliers ground on the end being most suitable for stripping. When all the large areas have been stripped, he takes his tweezers, which also have fine points, and carefully removes the top layer of rubber only alongside of each image or character; the fabric and second layer of rubber give additional support and better adhesion to the lead backing. Care in stripping is most important, since if a small line should not be cut, part of the plate might be torn and not easily repaired. A good engraver strips with his tweezers and knife at the same time, always using the latter to relieve the rubber while pulling it way.

Final Steps in Producing Plate

The plate is then cleaned up in the background and trimmed for use. If the plate is to be mounted on a patent base, it is beveled on all sides. For blocking type-high, the edges and perhaps a spot or two in the center are drilled with small holes and tacks put in. Care must be taken here since the lead backing is soft and if tacks are driven through it without first drilling, the lead might spread and cause a high spot on the plate, or if the tacks are driven through the lead they will produce low spots at these points, and excessive squeeze or impression will be required to bring them up, thus causing the plate to wear out before it should.

Washing off the shellac with alcohol is the final step, and the plate is ready for use. No rubber solvent, such

as kerosene or gasoline, should be used for a plate wash. Naphtha or benzene are used sparingly at times, but they also damage the plate, although evaporating before they can do much harm. The danger is that the solvents will attack the cement that holds the plate to the backing and that some small character would be softened and might fall off. Printing of the plate is comparatively simple. If make-ready is necessary, it should be placed under the plate and not under the tympan, and if the latter is necessary, the underlays should be located as deep or close to the metal as possible. The ink should be butter soft, not soup, as rubber plates will take the ink and lay it much more easily than metal plates.

Roller setting is a more important item. Form rollers should not sock the plate, as this kind of setting will ruin it. They should be set to kiss or bear as lightly as possible. Likewise the impression on the sheet should be a kiss, as excessive pressure on the plate will tend to distort the images so that second and third colors will not register; also the rubber will wear and pit wherever the impression is too great. Hard packing is always desirable.

Reproducing Additional Plates

Molded rubber printing plates are made in a vulcanizer from an original metal master. Reproducing the rubber plates, under these conditions, is comparatively simple and practically a mechanical operation. The mold or matrix is produced from type, cuts, or electrotypes, and as many plates as are required can be reproduced from each mold. Generally a phenolic compound, one form of which is known as "Bakelite," is used as matrix material, although many are on the market. This material must be molded at a temperature of approximately 300° F, and is allowed to remain under that heat and with sufficient pressure to give the mold a uniform thickness for eight to ten minutes. The mold is then removed from the master and is ready for producing the rubber plates. These plates are made to any required thickness and with any type of backing such as lead, aluminum, or brass; spring brass for multigraph use, or non-backed for aniline printing machines.

The cost of molded rubber plates varies from one-half to 2 cents per square inch, depending on how they are ganged on the press platen and the number produced in a working day. Many printers are today manufacturing their own rubber plates at a cost far below that of electrotypes or stereotypes, and they are getting results that are in a class by themselves.

Decided interest has been displayed in the use of synthetic rubber and resins to replace rubber. Most of these materials are cold-flow and are highly oil-resistant. Unfortunately, inasmuch as they are cold-flow materials, their resistance to abrasion is comparatively low, and, although they do not oxidize as readily as rubber, they wear or slough away with a result that their life is shorter.

A new method of treating a rubber plate today, known as case hardening, lengthens its life six to eight times. A good example of this is printing on chip board with a steel-faced electro that averaged 90,000 to 100,000 impressions before the plate was no longer fit for use. The printer decided to use an ordinary rubber plate for the same job and averaged 20,000 to 25,000 impressions. He later tried a case-hardened rubber plate and ran 240,000 impressions before the plate was no longer fit for use. Therefore, the rubber plate apparently gave much better service and had a longer life than a metal one. This, however, in our opinion, is not entirely true, as the stock on which he was printing was highly abrasive. It bears out one point which, in our estimation, is most important, a rubber plate used in the proper place is the best medium for the transfer of ink to paper.

Another point to be borne in mind in regard to molded rubber printing plates is that the initial installation for manufacturing this type of plate is low in cost, and $2,500 would cover the machinery necessary for a fair-sized printing establishment. To assume that with low-cost equipment, overhead and production cost would be in proportion is only natural. Further, from a service standpoint, a complete rubber plate, ready for use, can be produced in from twenty minutes to a half hour. This fact is of untold value to the printing establishment when a plate is damaged and a new one is necessary, because, in all probability, the printer already has the mold and can complete a replacement plate in ten minutes, thus eliminating waiting time for the press and speeding up production materially.

A newer type of printing is coming into vogue, or let us say that an old type is becoming popular, which is known as aniline printing. This is becoming popular in the paper-box, bread-wrap, candy-wrap, and gift-wrap fields. Finishes were available, most of which did not lend themselves to good letter-press printing. Fancy finishes, mostly embossed, were not suitable, or were too expensive, for average jobs that could use a decorative or fancy finished paper. The total tonnage sold to converters for printing by intaglio, coating, frictioning, or flinting was not as large as two mills' direct sales to large paper users today in fields that had not been touched in the past. Demand for papers with designs, trade-marks, and decorations in the box, papeteries, fancy-finish, offset, wrapper, and greeting-card fields was heavy. Quality-paper manufacturers were beginning to find a demand in the market for papers having a good appearance which would cost less and yet be effective.

Aniline Printing and Staining

They investigated the aniline printing and staining field. In the first place, only machines of foreign manufacture were available and paper manufacturers were skeptical because they knew nothing about them and were under the impression that the machines were complicated, but this idea was soon dissipated. Next, they learned that aniline inks were fugitive and, therefore, limited in use to papers that would not come in contact with direct sunlight; however, they could use them on some types of work. The next question that arose concerned printing rolls which had to be purchased in foreign countries and required two to four months for delivery so that only those who planned far in advance could hope to use them. Manufacturers had visions of their machines, if installed, being idle a great part of the time on account of lack of promptness in design-roll delivery.

Most industries have pioneers. Likewise, in the paper industry, one or two of the braver members ventured forth and purchased aniline printing machines to see what could be done. They were endeavoring to bolster up a steadily declining market that lacked something new and different. After a time, they called on ink companies and dyestuff manufacturers to do something about the ink. This has been done, not entirely, but to a point where no one fears an aniline ink or that it will be fugitive. The ink is no longer a true aniline, but is not just a fluid ink. It is still water-like but uses pigmented aniline dyestuff and, in some instances, a lacquer. Ink was only part of the difficulty. Mills

were getting inquiries and an occasional order that stipulated three weeks' and one month's delivery of paper that was done in a specific design. Therefore, they cast about for a rubber design-roll manufacturer. There was no such thing! Why should there be? There was no demand! Several companies tried to make rolls, and many were produced but none were as good as the foreign rolls. Accuracy and fineness of detail were not apparent. Proper technique was lacking.

Possibilities of Rubber Printing Plates

Today, one domestic roll manufacturer is completely equipped with knowledge, experience, and equipment to manufacture rubber printing or design rolls that will outlast and be more accurate than those of foreign manufacture. In many instances, complete rubber rolls, ready for use, are shipped within three days from receipt of an order, while three and four years ago, shipment required four weeks. On one occasion, where a paper mill was required to promise delivery of the first paper within a week, the complete trade-mark rubber design roll was shipped to the mill 48 hours after receipt of the roll order.

A textile manufacturer can, therefore, change a brand, order his wrapping paper, and ship goods in the same season. A shoe manufacturer might redesign his name or trade-mark and have boxes covered with the new design within from three to four weeks. Greeting-card manufacturers can include last-minute designs in current lines. Likewise, no long conferences and large appropriations are necessary for users of wrapping papers to trade-mark their papers; the cost is nominal and the advertising value, great. Corrugated-box manufacturers are printing over-all patterns or designs on the board as it comes from the combiners and then overprinting the name and quality of the specific item that goes into the container. Several liquor manufacturers are now purchasing boxes which are done in this same manner.

Paper can be watermarked with rubber design rolls and an ink that penetrates the sheet and makes it more transparent in the mark, without disturbing the fibers in the sheet, and at a fraction of the cost of a dandy roll. Perhaps, many will criticize the method or idea, but, if it is not done in this manner, it never will be, and the additional revenue will never be collected.

Staining papers with rubber rolls and fluid inks is also an important feature. Small runs of tissue or lightweight papers can be done, and done well, on an aniline machine. One manufacturer, who has as many as 30 shades of tissue to do on short notice, saves money by running white and unbleached stock and staining for color shades. He runs the exact quantity of paper required and cuts out the staining machine or switches to another color. Another mill runs a two-toned sheet with a fluid ink and it appears to be coated when completed.

The field of rubber design rolls in this new and versatile machine, employing fluid-type inks, has only been scratched. With slight changes, unlimited effects and uses can be accomplished. These machines are being speeded up to the point where 800 to 1000 f.p.m. is not far off. Drying is almost instantaneous and no festooning is necessary; neither is the printability of the paper affected. Inks can be changed to meet the requirements as to opacity, drying, brilliance, and the like. Precison rubber printing and design rolls are here.

Another new thought in connection with printing has been the combination of aniline and letter-press printing in the same operation. This work, of course, is done from web, the idea being that use of oil inks on large solids is expensive. Furthermore, drying becomes an all-important problem but is easily solved by using anilines for one or two colors in the large solids and oil inks for fine details since aniline inks dry instantaneously and do not affect the subsequent printing of oil inks. One printing-press builder has already made the plans for a six-color press of this type. Often, a job requires a particular shade or color of paper, and buying a particular quantity of paper from the mill in a beater-stained sheet is not practical. With a press of this type, the exact quantity of paper can be stained to the desired shade and printed in the same operation. Weeks of waiting for paper deliveries are thus saved. Service to the customer could not be better. One English company has been satisfied to use the process in its own plant for some time and say nothing about it to the world. I have seen some work done by this firm which was beyond criticism. The application and use of rubber plates have barely been explored, and, henceforth, rubber plates apparently will be adapted to jobs that heretofore would never have been considered.

Elastic Shoe Leather

A NEW ELASTIC shoe leather, which depends on the backing of a finely woven fabric made with "Lastex" yarn for its elasticity, has been introduced. According to its sponsors, this new material holds revolutionary possibilities for both the shoe trade and other industries.

Genuine shoe leather is used in the manufacture of the new elastic leather. The genuine leather is put through a chemical process which restores the original flexibility of the skins, lost through the tanning process. This chemical treatment renders the skins easily stretchable and without any distortion of the surface. The addition of an elastic backing, made of "Lastex," results in a leather-faced product which is not only flexible but which remains permanently elastic.

The advantages of the new material to the shoe industry lie in the fact that it makes possible a glove-fitting type of shoe without causing any discomfort through pinching or binding, while it also eliminates the necessity of buckles, laces and other fasteners. At the same time it permits the shoe designer to create new beauty in his products through simplicity of line.

Another important advantage claimed is that use of the new leather will take care of the variation of sizes of women's feet. By necessity, factory-made shoes woman's foot does not exist. In other words, no two must be built to ideal last sizes, although actual research is reported to have determined that an "ideal" women buying the same size shoes will be found to have exactly the same measurements. This lack of uniformity in foot sizes is said to be the major cause of the foot troubles of which women complain.

At the present time the elastic leather is being used in the higher grade women's shoes, although the field is expected shortly to be broadened to include men's shoes and the more popularly priced men's and women's shoes. The new leather is the invention of Alfred Vamos, well-known shoe stylist and designer, who has assigned his patent rights to the United States Rubber Company.

An index to Volume 41 of THE RUBBER AGE will be found facing page 74 of this issue.

Rubber Expansion Joint Filler

DESIGNED for all conventional joint openings used in concrete highways, structure, curbs, sidewalks, tanks and other miscellaneous types of construction, a new type of rubber expansion joint filler has been developed by the B. F. Goodrich Company, Akron, Ohio. These fillers are preformed strips made of wear-resisting rubber. They are designed with flexible lips on the two sides, the

Laying the new Goodrich joint filler.

lips projecting upward against the concrete surface of the joint opening (shown by the inset in the illustration herewith). This projection makes their removal difficult.

The preformed strips are made with large tubular openings in the center in order that they may be easily compressed. The top surface is slightly indented or grooved to provide for downward thrust of surface upon compression. Due to this feature, it is impossible for material to extrude above the wearing surface of the pavement, according to Goodrich engineers. The strips are furthermore designed to be placed under partial compression as they are made about 25% wider than the opening in which they are to be used. This permits the rubber to follow the concrete as it contracts and yet to compress readily when the concrete expands.

In practice, the strips should be placed in the bottom, ends and top of the joint opening which provides a rubber gasket around the entire cross-section of the pavement or structure. The strips can also be used with the several types of joint opening devices now available and make efficient seals for air cushion joints. Goodrich claims that the use of these joint fillers eliminates expensive joint maintenance work, entails no waste through trimming, and enables quick installation by unskilled workmen. The illustration shows a strip being laid without the aid of any special tools.

Tests taken by G. J. Irwin, Goodrich highway engineer, on the new rubber expansion strips in concrete highways which have been serving in experimental installations for more than two years, determined that a regular 60-foot slab of concrete changes as much as four-tenths of an inch with a variation of 100 degrees in temperature. This expansion is automatically taken up by the elasticity of the rubber.

Expansion of the concrete caused by extremely hot weather, which results in bumps in the road when the joints are filled with tar or asphalt, reaches a maximum of nearly one yard to the mile, as compared to the length in zero weather, according to Mr. Irwin. There are 111,350 miles of concrete highway in the United States, and it is estimated that the "phantom highway" created by the expansion of concrete under the blistering rays of Summer sun reaches a maximum aggregate length of 61 miles.

Ucrete Rubber Concrete

COMBINING the properties of both concrete and rubber, a new material called Ucrete has been developed by F. Hulse and Company, Ltd., Woodlesford, Leeds, England. Available in both powder and solution form, Ucrete mixtures can be made to best suit the purpose for which the material is being used, *i.e.*, if flexibility, resilience, insulation or abrasion to resistance are the more desirable properties, then larger percentages of the solution is used, while if hardness is the desirable factor, then the powder is the major ingredient.

Ucrete is said to be easy to handle and can be applied with a trowel. For waterproofing purposes, it should be applied to a damp surface. The material can be made into slabs and sheets and transported to any point desired, or it can be used at the scene of construction. Once formed, it can be cut, sawed, bored, drilled, punched, molded, or cast. Advantages claimed by the manufacturer for Ucrete over ordinary concrete and rubber include its waterproofness, the fact that it sets like cement and is not dependent upon evaporation, is dustless and has good wearing properties, has strong adhesive properties, and does not form brittle objects when molded.

According to Hulse engineers, the new material may be used for bricks, brush covers, buttons, pathways, roofing, door handles, cisterns, wainscoting, roofing tiles, door posts and fasteners, linings for tanks, cable coverings, caulking for woodwork, sink linings, ceilings, drain pipe joints, and furniture casters. Other uses include layers for tennis courts, roads, paths, etc.

Wrapping Tires in Cellophane

DOUBLE wrapping of white sidewall tires, using cellophane as the inner wrapper, has been adopted by the Seiberling Rubber Company of Akron, Ohio. The new type wrapper enables the tire to be seen by prospective customers at all times without removing the wrapper in order to put the tire on exhibition, and also serves the dual purpose of keeping the tire spotlessly clean until actual use. Soiled white sidewall tires are not readily salable, according to Seiberling.

There is little difference in the methods of wrapping tires in cellophane or kraft paper, the latter being the general type of wrapping material. Rolled strip is used, but the edge is not folded or glued when cellophane is used as it is when ordinary kraft paper is used. The tension on the wrapping machine is the same in both cases, but when the complete wrap is made in the case of cellophane, it is not necessary to use gummed tabs to hold the end of the spiral in place. The end of the cellophane strip is merely touched with a hot iron and a perfect seal is formed, heat-treated cellophane being self-adhering.

An index to Volume 41 of THE RUBBER AGE will be found facing page 74 of this issue.

Automatic Sorting of Potatoes

RUBBER has been adapted for many strange uses, but one of the strangest is its use in connection with a new machine which automatically grades potatoes according to their size. Farmers

are faced with the task of sorting thousands of bushels of potatoes into market grades every Fall. One inventive farmer decided to construct some mechanism that would do the job automatically. The result was a machine equipped with mechanical fingers, the fingers being made of bristles and mounted on pairs of discs. Each pair was set farther apart so that when the potatoes moved over the assembly they were automatically separated according to size.

Use of the machine, however, resulted in the discovery that while the mechanical fingers made of bristle worked satisfactorily for a time, they soon wore out and broke off quickly. Contact with the B. F. Goodrich Company of Akron resulted in the development and adoption of fingers made of a special wear-resisting rubber which not only graded the potatoes perfectly without injury, but cleaned them as well. Several of these machines are now in operation. Cleaning and grading is entirely automatic, the only manual labor required during the grading process being the removal by hand of those potatoes injured during digging and storage.

Plastic Materials From Rubber and Tar

INVESTIGATIONS on new applications of rubber, particularly in conjunction with tars and resins, were described by Sir Gilbert T. Morgan and Dr. D. D. Pratt before a recent meeting of the Midland Section of the Coke Oven Managers Association, at Sheffield, England. One of the first problems that arose was the development of a stabilizing medium for anthracene oil-rubber-pitch compounds, since rubber is not compatible with high-temperature tars and although anthracene oil dissolves rubber, addition of a pitch to such a solution causes immediate separation of the rubber.

The amount of rubber which can be introduced in one run through the Hurrell homogenizer varies with the type of oil. Low-temperature tar oil can absorb 7 to 8% of its weight of rubber whereas 5% is the maximum for anthracene oil. The final, clear limpid solutions, however, can be utilized as fresh starting materials, and solutions containing up to 20% of rubber can thus be concentrated. When pitch was added to samples of these solutions of rubber in tar oils, it was observed that whereas the mixtures obtained with low-temperature and vertical retort oils were stable, the corresponding products containing high aromatic oils induced a separation of rubber in the form of a coagulant.

On the other hand, high aromatic tar oils are unsuitable as a medium for pitch and rubber when the former is in greater concentration than 10% of the mixture, quite irrespective of the rubber content.

In seeking an explanation of the differences in behavior of these tars towards rubber, it is recalled that oils of low aromatic tars are chiefly paraffinoid, and substantially free from the crystalline constituents with which anthracene oil is saturated. It would appear that although the crystalline components of anthracene oil do play an important part in the stability of rubber and pitch mixtures in that oil, yet the paraffinoid oils of low-temperature tars form a better medium than the wholly aromatic oils of high-temperature tars.

Two possible methods for the preparation of stable compounds of high aromatic tars with rubber were, therefore, suggested by the speakers. First, the utilization of a high aromatic oil not saturated with crystalline hydrocarbons, obtained by refrigeration and filtration of anthracene oil, or by selection of a distillate such as "dead oil" distilling between the naphthalene and anthracene fractions. Second, the dilution of a high aromatic tar by an oil substantially free from solid hydrocarbons was suggested as an alternate method of stabilization.

Rubber-tar compounds, similar to those derived from latex, are obtainable from crepe rubber which, when milled in the presence of tar oils, is converted into a plastic material containing approximately 80% rubber and 20% oils. All grades of Rubbone are readily compatible with the various types of tar, this incorporation being accomplished by heating the materials at 120° C. for one hour. The blended products are stable homogeneous liquids of increased viscosity and "stiction" as compared with the original tar.

Vulcanized rubber does not dissolve in tar oils, but forms dispersions which, however, by suitable manipulation, can be obtained as gels. When vulcanized latex and tar oils are passed through a colloid mill at 100° C., water is removed and ultimately a clear gel is produced. Such gels are obtainable from vulcanized latex and oils from any type of tar.

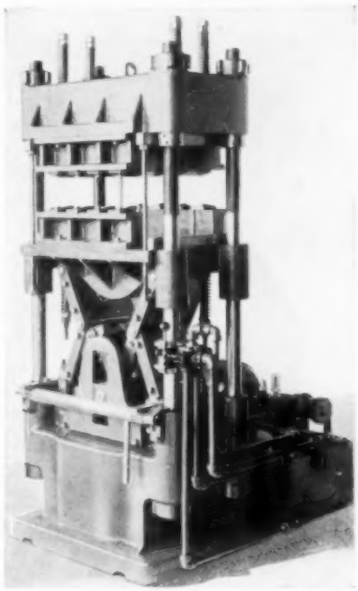
Cavalite Hospital Sheeting

DESCRIBED as being extremely light in weight and of smooth texture, a new type of hospital sheeting made from Cavalite, a rubber-coated silk material, has been developed by the Fabrikoid Division of E. I. du Pont de Nemours & Co., Inc., Fairfield, Conn. The new sheeting has been designed to fit snugly to the mattress and when covered with the bed sheet its presence cannot be felt by the patient, according to DuPont. A series of tests, reproducing all conditions of rigorous hospital usage, applied to the new sheeting is said to have indicated its advantages over similar products. These tests included baking for thirty-five days in a Geer oven, a 24-hour period in which five sterilization preparations were applied, a 4-hour exposure to steam, 24 hours of alcohol immersion, and 24 hours of ether, perspiration and urine testing. The Cavalite sheeting is completely waterproof.

New Equipment

Improved Standard Molding Press

DUE to several improvements, the Standard Self-Contained Molding Press, a product of the Standard Machinery Company, Mystic, Conn., can now be easily and economically adapted to a wide range of pressures. By either one of two simple adjustments, it is now said to be possible to reduce the total rated capacity of this press. For continued maintenance of pressure, a simple adjustment in the high pressure



Standard Molding Press

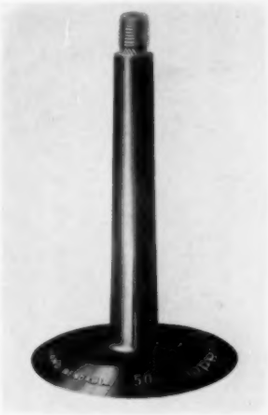
pump release valve changes the pressure delivered on the platen of the pump from its total capacity to any desired point down to approximately one-third of its rated capacity. The same results may be accomplished by lowering the position of the "thrust" block. An indicator attached to the block and a pressure scale on the guide make this adjustment an easy matter and one of few seconds time. These two features are of particular advantage to shops doing diversified work that requires wide range of pressures and to custom molders. The Standard presses are available in 50, 100, 150 and 300 ton models.

Marks Polarizer and Analyzer

DESCRIBED as an "extra eye", the Marks Polarizer and Analyzer is being marketed by the Laboratory Equipment Company, New York City. This device enables the user to detect defects, such as strains, and irregularities in rubber, glass, plastics, and other materials. Both the polarizer and the analyzer are easily slipped into position on any type of microscope. The image is said to be seen clear and well defined, with all colors appearing clearly. The polarizer is also said to be more advantageous in making color photomicrographs than other types because it polarizes a wider cone of light.

Schrader Hand Bendable Valve

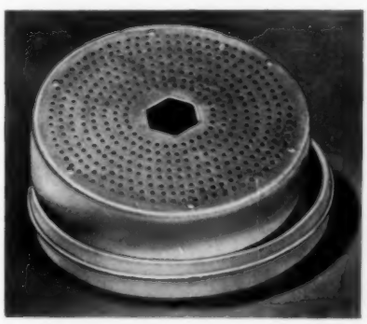
A HAND bendable rubber-covered valve, termed Model 50-R Valve, has been developed by A. Schrader's Son, Brooklyn, N. Y. This valve may be single bent to any desired angle to fit wire, disc wheels, etc. The valve insert is made of special metal tubing



which assures correct hand bending and which will not close the air passage. The base of the valve is prepared for vulcanization to the tube and it may be bent before or after it has been applied to the tube. This hand bendable valve is said to eliminate the necessity of dealers stocking several styles of angle valves.

Actigel Perpetual Desiccant

A DEVICE to control humidity in balance cases and cases for precision apparatus (such as microscopes and other instruments) has been developed by the Acticarbone Corporation, Lincoln Building, New York City. Known as the Actigel Desiccator, this device consists of a cartridge charged with an inert non-corrosive, non-deliquescent adsorbent, enough to keep air dry in a receptacle with a volume up to 200,000 cubic centimeters at room temperature. A "tel-tale spot" in



the center of the cartridge is normally blue. It becomes pink when regeneration is needed. Regeneration is secured by placing the cartridge in an oven at 150° C. The cartridge comes in a metal container equipped with an easy opening device. In addition to its other uses, the Actigel Dessicator is useful in the home for maintaining the condition of chocolates, crackers, sugar, salt and other moisture-absorbing food products.

Sankey Shin Guard

INCORPORATING silent toe piece and quick fastening attachments, an aluminum-alloy shin guard has been developed by the Ellwood Safety Appliance Company, Ellwood City, Penna. This new unit is said to afford foot and leg protection against hazards such as found in many manufacturing processes. The complete guard, which is marketed attached to the company's foot guards, is easily put on without special adjustment, comfortable to wear and permits free boot and leg action on the part of the worker, according to its manufacturer.

Sankey Shin Guard Attached

Davis Automatic Sparker

A CLOSE check on the insulating faults of insulated wire can be maintained by the Davis Automatic Sparker, a development of the R. L. Davis Electric Co., Inc., Wallingford, Conn. This check may be made while wires are being re-reeled from vulcanizer drums or during depanning from vulcanizer pans. By sparking at such times, no additional handling of the wire is required. The Davis Automatic Sparker is composed of four principal parts—an electrode unit, a transformer, a take-up and a pay-off stand. The electrode unit is a welded steel housing containing all of the electrical apparatus. Two porcelain high tension insulators are attached to the top of the housing that supports a pipe through which the wire runs while under test. The transformer is designed to deliver sufficient amperage to break down all the dielectric faults in the insulation, but low enough to prevent injury to the operator by accidental contact. The take-up is built of welded angle iron entirely enclosed by sheet iron sides and cover. A 1200 r.p.m. ball-bearing polyphase motor drives the main shaft through a pinion and spur gear. Single brake adjustment is possible because the brake is outside the machine. The pay-off stand is constructed of a pair of welded angle iron "A" frames. To load the pay-off a lever is raised which slides the sub-frame toward the floor, thus enabling the operator to slide the reel on the shaft without lifting. The reel is then raised into operating position by pushing the elevating lever down. When the take-up mechanism stops, the brake will not take hold until the wire is slack, thus preventing the wire from stretching or breaking.

Book Reviews

The Chemistry and Technology of Rubber. Edited by C. C. Davis and J. T. Blake. Published by Reinhold Publishing Corp., 330 West 42nd St., New York City. 6x9 in. 940 pp. $15.00. (A.C.S. Monograph No. 74.)

(Available from Book Department, THE RUBBER AGE*)*

Published under the auspices of the Rubber Division of the American Chemical Society, this monograph comprises twenty-five chapters, each touching on an important phase of rubber chemistry, and each written by one or more experts in that particular phase of the industry. In addition, there are extensive subject and author indexes, as well as a bibliography of literature on the chemistry of rubber, prepared by C. C. Davis. Titles and authors of chapters follow:

Composition of Crude Rubber, A. Van Rossem; *Physical Properties of Raw Rubber,* G. Stafford Whitby; *Chemistry and Structure of Rubber Hydrocarbon,* Harry L. Fisher and R. H. Gerke; *Mastication and Plasticity,* Wilfred Gallay; *Structure and Behavior of Rubber in Solvents,* Warren F. Busse; *Theories and Phenomena of Vulcanization,* Ira Williams; *Vulcanization Without Sulfur,* I. I. Ostromislensky; *Accelerators—Their History and Use,* S. M. Cadwell and J. W. Temple; *Theories of Acceleration,* Winfield Scott and L. B. Sebrell; *Physics of Vulcanized Rubber,* W. W. Vogt; *Fillers and Reinforcing Agents,* N. A. Shepard, John A. Street and Charles R. Park; *History and Use of Materials Which Improve Aging,* W. L. Semon; *Autooxidation and Deterioration by Oxygen—Prooxygens and Antioxygens,* Charles Dufraisse.

Deterioration of Rubber by Heat, Light and Ozone, F. H. Cotton; *Electrical Behavior of Rubber,* A. T. McPherson; *Properties of Latex,* W. A. Gibbons and P. D. Brass; *Industrial Uses of Latex,* D. F. Twiss, E. A. Murphy, E. W. Madge, and G. W. Trobridge; *Hard Rubber (Ebonite),* A. R. Kemp and F. S. Malm; *Rubber Derivatives of Commercial Utility,* T. R. Dawson and P. Schidrowitz; *Synthetic and Substitute Rubbers,* Thomas Midgley, Jr.; *Gutta-Percha and Balata,* J. N. Dean; *Reclaimed Rubber,* George W. Miller; *Practical Compounding,* W. F. Russell; *Physical Testing and Specifications,* A. W. Carpenter; and *Chemical Analysis of Rubber and Rubber Products,* R. P. Dinsmore, R. H. Seeds, and H. E. Rutledge.

Gathered from world-wide sources, collected over a period of years, and written in the midst of current developments, it is natural that some of the material presented is more up-to-date than others, and that more stress is laid on certain chemical aspects than others, two points Mr. Davis makes in his preface. Despite this, however, it is certain that this monograph represents the greatest contribution between two covers made to rubber chemistry.

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Polymerization—and Its Applications in the Fields of Rubber, Synthetic Resins, and Petroleum. By R. E. Burk, H. E. Thompson, A. J. Weith and Ira Williams. Published by Reinhold Publishing Corp., 330 West 42nd St., New York City. 6 x 9 in. 312 pp. $7.50. A.C.S. Monograph No. 75 *(Available from* THE RUBBER AGE*).*

Polymerization is included in those theoretical fields which directly underly numerous practical problems and developments and which it is not the special obligation of any one company to develop at its own expense and for the partial benefit of others. Naturally, such theoretical fields do not receive the attention given to other fields, except by a few of the largest organizations and then to a somewhat limited extent. This is the case with polymerization, which has a practical bearing in rubber, petroleum, resin and paint, as well as in coal, coal tar, cellulose, etc. In this monograph, the authors attack the subject from both the theoretical and practical viewpoints. It has eight chapters, covering all angles of the subject. In the chapter devoted to polymerization in the rubber industry, subjects covered include natural, sol and gel rubber, cyclization and vulcanization of rubber, polymerization methods, methyl, butadiene and chloroprene rub-

bers, mixed polymers, rubber-like plastics, etc. Extensive references are given at the end of each chapter. Complete subject and author indexes are included. The monograph represents the most collective data on polymerization yet published.

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The Retardation of Chemical Reactions. By Kenneth C. Bailey. Published by Edward Arnold & Co., London, England. Available from Longmans, Green & Co., New York City. 6 x 9 in. 480 pp. $8.00.

Although particular instances or groups of retarded reactions have been treated fully in many works on chemical kinetics, this is the first book dealing with retardations in general to appear in any language. The author, in his preface, points out the importance of understanding not only the promotion of desirable reactions, but also the retardation of undesirable ones. Each important branch of the subject is treated historically so as to reveal the gradual development of ideas, while the order of the chapters was decided by types of reactions. The book contains 31 chapters, in addition to author and subject indexes and an extensive bibliography, including a 10-page chapter on the protection of rubber.

Booklets, Catalogs, etc.

News About DuPont Rubber Chemicals. Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware.

The September 1, 1937, issue of this monthly house organ contained the following reports (the numbers following titles indicating report numbers): Extruded Tubing and Strip Compounds—Rubber and Neoprene (201), Combination Inner Tube Patch Material (203), Tire Repair Stocks (204), Air Bags (IR-6), Reclaimed Rubber in Tires (IR-5), Cool Running Truck Tire Carcass Stocks Designed for Low Hysteresis Loss (IR-7). The October 6, 1937, issue contained these reports: Aquarex D and Aquarex F (205), Neoprene Compounding Principles—Processing (N-5), Transparent Rubber (IR-8), Hard Rubber Sponge (IR-9), Accelerator 808 in Clay Stocks (P-3). This issue also enclosed a reprint of "The Evaluation of Rubber and Rubber-Like Compositions as Vibration Absorbers," a paper delivered by Felix L. Yerzley at the Chapel Hill (N. C.) meeting of the Rubber Division, A.C.S.

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The Modern Purifier. Industrial Chemical Sales Division, West Virginia Pulp & Paper Co., 230 Park Avenue, New York City. 6x9 in. 98 pp.

The development of commercial activated carbon, and its application to sugars and syrups, chemicals and pharmaceuticals, alcoholic beverages, various food products, sewage, etc., is well told in this booklet. A discussion on the origin and characteristics of this purifying agent is also included, as is a chapter devoted to some basic principles relating to purification. Several new and potential uses are described. The company's activated carbon is known as Nuchar.

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Accident Rates in the Rubber Industry—1936. National Safety Council, Inc., 20 N. Wacker Drive, Chicago, Ill. 8½x11 in. 8 pp.

Injury rates in the rubber industry during 1936 averaged 7.87 for frequency and 0.75 for severity on the basis of reports from 41 factories whose employees worked 131,661,000 man-hours during the year, which are about only one-half as high as the all-industries averages of 13.57 and 1.64, respectively. Full details, comparisons with other industries, types of accidents, causes, etc., are given in the pamphlet, which contains several charts and tables.

Commemorating the Silver Anniversary of a Notable Union—1912-1937. Binney & Smith Co., 41 East 42nd St., New York City. 9-12 in. 8 pp.

Consisting of a 4-page advertising insert which appeared in various rubber and other technical journals, in addition to the article on "Pioneering Carbon Black in American Tires" which was published in the July, 1937, issue of the *India Rubber World*, this booklet is devoted to the 25th anniversary of the use of carbon black in American-made tires. The growth of the Binney & Smith Company is also briefly told.

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Goodyear Rubber Flooring. Goodyear Tire & Rubber Co., Akron, Ohio. 8½x11 in. A Picture Portfolio.

Ninety-five illustrations appear in this picture portfolio of rubber flooring installations, covering practically every type of the most common applications of rubber flooring, both of the rubber tile and roll varieties. The only copy appearing in the entire portfolio is a brief description of the company's flooring on the first page. The pictures tell a complete story to architects, contractors and others interested in construction work.

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Johns-Manville Industrial Products. Johns-Manville, Inc., 22 East 40th St., New York City. 8½x11 in. 64 pp.

Profusely illustrated, this latest J-M catalog contains valuable information and recommendations on high and low temperature insulations for every industrial need. It describes and illustrates the company's built-up and insulated roofs, electrical conduit and other electrical materials, flooring materials, industrial friction materials, etc. A section is also devoted to specialty materials for sound control of mechanical equipment.

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The Cash Budget. Policyholders Service Bureau, Metropolitan Life Insurance Co., New York City. 8½x11 in. 38 pp.

This latest report, one of a series prepared by Metropolitan, treats with the problem of cash resources in business. It represents the result of a survey of the practices followed by 45 companies, including the American Hard Rubber Company and the Thermoid Company. Examples of procedure are given for both large and small corporations, with three general methods of forecasting cash described.

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Tractor and Implement Tire Handbook. B. F. Goodrich Co., Akron, Ohio. 5x8 in. 44 pp.

This handbook includes pneumatic tire specifications for farm implements, such as combines, grain and rice binders, corn shellers, ensilage harvesters, etc. The data includes the make and model of nearly all the equipment of various kinds in use, size of each type wheel, size of tires and recommended air pressure in service, and the recommended load to be carried. It is of particular interest to manufacturers of tractors and farm vehicle equipment.

•

Fluid Power Pumps and Motors. The Oilgear Co., 1301 W. Bruce St., Milwaukee, Wisc. 8½x11 in. 56 pp.

The company's comprehensive line of modern fluid power pumps and motors are described and illustrated in this catalog (Bulletin 47000). More than twenty sizes of radial piston pumps and motors for pressures up to 3,000 pounds per square inch, are discussed. Applications of the various types of equipment available are indicated. Factory managers particularly will be interested in this catalog.

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Brown Pyrometers—Potentiometer and Millivoltmeter Types. Brown Instrument Co., Philadelphia, Penna. 8x10½ in. 48 pp.

This latest Brown catalog (No. 1102) covers the complete line of the company's potentiometer pyrometers—indicating, recording and controlling—and also includes descriptions and illustrations of the new Electro-Line controllers and the equally new Brown proportioning control system. Complete specifications of each type of pyrometer are given.

Editorial Comment

"Collusion" On Tire Bids

IT is difficult to appreciate the reasons behind the Government's charges of collusion against fourteen tire manufacturers for submitting identical bids in two separate cases on the Government's tire requirements for the six-month period from October 1. It is still more difficult to accept the Government's attitude in negotiating and executing a contract with Sears, Roebuck and Company, after rejecting the bids of the tire manufacturers. The situation may truly be called a paradox.

In the first place, it is an admitted ambition of this Administration to place competitive bidding on an equal footing. The N.R.A. took this aim. The A.A.A. carried it on. The Guffey-Vinson Coal Act compels the bituminous companies to practice it or be heavily fined. *Ad infinitum.* True, many of these attempts have been ruled out by Supreme Court decisions, but additional legislation restores them partially or completely, awaiting further court decisions. Why then charges of collusion? The Government defense that monopolistic practices should and must pertain to "distressed" industries alone can hardly be accepted. Think what that defense can mean? Stringent rules laid down by Washington individually by industry. And selection of the "distressed" industries solely in the hands of the Administration. The economic and political angles involved are not for discussion in these columns.

How can the Government explain away its second action—negotiating a contract with the mail order house? Here we truly have a case of not letting the right hand know what the left hand is doing. The Federal Trade Commission prosecuted Goodyear in a long and drawn out case to make it "cease and desist" from supplying Sears-Roebuck at prices which permitted that concern to sell its private-brand tires at retail prices low enough "to drive small dealers out of business." Disregarding the legal angle, which presumably prevents the Government from "negotiating" contracts of any kind, but compels it to secure bids through advertising for contracts, can the Government defend its stand on the grounds that the prices secured from Sears-Roebuck, which were lower than those submitted on every type of tire by the fourteen tire manufacturers accused of collusion, do not amount to "price discrimination," as charged in the Goodyear case?

The Government may find that it has bitten off more than it can chew. The situation was brought about primarily through its own doing. Even now the tire manufacturers are considering retaliatory action. It is highly probable that they will seek to enjoin the Treasury from carrying out its contract with Sears-Roebuck on the grounds that there has been no proof of collusion, that the Secretary has no authority to award contracts except as the result of competitive bidding, and that the tires purchased are of a grade originally barred from the contract advertisements. The independent tire dealers, through the National Association of Independent Tire Dealers, are also registering protests.

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The Wages and Hours Bill

OF all legislative matters facing the next Congress, whether called in special or regular session, the most important to industry is probably the Black-Connery Bill, officially termed the Fair Labor Standards Act of 1937, and more commonly known as the Wages and Hours Bill.

This bill, if passed, would confer upon a Federal Labor Standards Board of five members a virtually unrestrained authority to fix for every industry minimum wages and maximum hours and to change such hours and wages at its discretion. The law would not pertain to persons employed in an executive, administrative, supervisory or professional capacity, nor to agricultural laborers.

The magnitude of such a task is appalling. The effect upon industry can quickly be realized. The result would affect every manufacturing concern, large or small. Yet, following its usual attitude toward Government regulation until after bills become laws, industry has presented an apathetic front to this legislation, with the exception of a few industries represented by their national associations.

Few deny the good to be gained by standardized wages and hours. It is the method of such standardization and its subsequent control that is highly important. We are inclined to agree with the special committee of the Chamber of Commerce of the United States that any correction of hours-and-wages abuses should be made by state legislatures and not be attempted by Federal legislation. Your congressman will appreciate your views. Tell them to him.

CURRENT • NEWS
of the Rubber Industry

OCTOBER, 1937

Collusion Charge by Treasury Department Is Filed Against 14 Tire Manufacturers

Government Awards Six-Month Tire Contract to Sears-Roebuck After Rejecting Identical Bids on Various Types and Sizes Received from Manufacturers Named

ANNOUNCEMENT by the Treasury Department of the United States Government on October 1 that it had awarded a $1,000,000 contract to Sears, Roebuck and Company to supply the Government with tires for six months from that date, brought forth the disclosure that fourteen tire manufacturers had submitted identical bids on two occasions within the past three months on the same contract and that the Treasury on September 10 referred the names of these manufacturers to the Department of Justice and the Federal Trade Commission for investigation on the grounds of "collusive bidding." It was further revealed that F.T.C. agents have been working in Akron for some time seeking information on marketing policies of the tire manufacturers and on the time relation in announcement of price changes by the major companies.

The fourteen companies named by the Treasury in its complaint are Dayton, Firestone, Fisk, General, Goodrich, Goodyear, Kelly-Springfield, Lee, Pennsylvania, Schenuit, Seiberling, U. S., Mohawk and Norwalk. In its advertising seeking bids on its tire requirements (which amounted to $2,800,000 for the last fiscal year), the Government invited all tire and rubber manufacturers to bid, and is said to see certain significance in the fact that only fourteen companies tendered bids and that all were identical.

Selection of Sears Questioned

It is considered strange in the industry that the concern from whom the Government will secure its tires is the same as that involved in the case which the F.T.C. pressed against Goodyear, alleging that Goodyear was driving small dealers out of business by supplying Sears-Roebuck with tires at a discount or "price discrimination" amounting to as much as 53%. As a result of this suit, which ended in a "cease and desist" order entered against Goodyear, that company cancelled its contract with Sears-Roebuck. It subsequently appealed the verdict and a hearing was scheduled before the Circuit Court of Appeals in Cincinnati on October 5.

Treasury officials explain the situation in this light: After advertising for bids to fulfill Government tire requirements, they received identical bids from the fourteen companies named. Repeating the advertisements they again received fourteen identical bids. On the ground that it would have been illegal to accept any of the identical bids, the Procurement Division negotiated a contract with Sears-Roebuck and secured lower prices on practically all tire sizes involved than those submitted by the tire manufacturers.

It is quite probable that some of the tires obtained by the Government from Sears-Roebuck will be produced by some of the tire manufacturers whose bids were rejected, although Sears-Roebuck also secures tires from manufacturers other than those named in the Treasury's complaint, such as Armstrong, Dunlop and Mansfield.

It is expected that the Department of Justice will proceed against the tire companies, as its facilities are better suited to prosecution of this type than are those of the Federal Trade Commission. The F.T.C. has attempted on several occasions to break-up alleged price-fixing efforts by members of the rubber industry and during the N.R.A. obtained a consent order from 17 companies, some of whom are involved in the present complaint, to refrain from anti-trust law violations.

According to representatives of some of the tire manufacturers involved, an appeal to the courts to prevent Secretary of the Treasury Morgenthau from carrying out its contract with Sears-Roebuck will probably be taken on the grounds that there has been no proof of collusion, that the Secretary has no authority to award contracts except as the result of competitive bidding, and that the tires purchased are of a grade originally barred from the contract advertisements. The first indication that the tires purchased from Sears-Roebuck were of a grade barred in the original advertisements was given in these statements. The Treasury contends that negotiation with individual companies is permissible if the Secretary decides that a "public exigency" makes necessary such action.

N.A.I.T.D. Enters Protest

The National Association of Independent Tire Dealers, Inc., through its secretary and general manager, George J. Burger, sent a wire of protest to President Roosevelt against awarding of the contract to Sears-Roebuck. In his wire Mr. Burger stated that the practices and policies of Sears-Roebuck have been "most unfair and demoralizing" and were "destroying the future living of the independent dealer." He also alleged that investigation of contracts now existing between the mail order house and tire manufacturers supplying them with tires would reveal that they are in violation of the law. A similar protest was lodged by the N.A.I.T.D. with Attorney-General Cummings.

Assistant Attorney-General Robert H. Jackson, head of the Department of Justice's anti-trust division, has been placed in charge of the investigation. At last word, Mr. Jackson stated that evidence now in the possession of his division was insufficient to determine whether prosecutions will be instituted.

Cotton Consumption

America's rubber industry is one of the largest customers of the agricultural South, having used 375,000,000 pounds of cotton with an estimated value of $52,500,000 during 1936, according to P. W. Litchfield, president, Goodyear Tire and Rubber Company, Akron. He also stated that American rubber manufacturers consumed approximately 1,288,000,000 pounds of crude rubber in 1936 valued at $211,103,-200. Two rubber trees must be tapped for a whole year to obtain enough rubber to make a six-ply tire for a low-priced car, according to the Goodyear executive.

CHOLET ADDRESSES RHODE ISLAND CLUB

Dr. Prosper E. Cholet, consulting chemist for H. Muehlstein and Company, New York City, was the main speaker at the first meeting of the 1937-38 season of the Rhode Island Rubber Club, held on September 24 at the Metacomet Golf Club, East Providence, R. I. A second speaker was Arthur W. "Jeff" Davis, feature writer on one of the Providence (R. I.) newspapers.

Dr. Cholet, who recently returned from an extensive trip to the Far East during which he investigated the preparation of special rubbers, particularly the soft rubber sold by the Muehlstein concern under the trade name of Essar, delivered a talk on "Recent Experiences at the Plantations." He also presented a number of slides showing how Hevea trees look between the time of sowing the seeds, the first and last tappings, and up to that of cutting the tree for firewood.

According to the speaker, it should now be possible for manufacturers to regulate rubber plasticities by blending suitable amounts of special rubbers, such as Essar, now available from the plantations, with the known standard grades. He claimed that when such blends are effected, savings on power costs would result. He predicted that a number of special rubbers, some with controlled and desirable non-rubbers, would soon be shipped from the plantation countries.

In addition, Dr. Cholet also presented several slides showing the lives led by both native and white men at the plantations. He then told of his airplane trip from Amsterdam to Batavia and back, expressing satisfaction with the American-equipped Dutch Air Lines. Dr. Cholet, himself, is also an aviator. Finally, he showed pictures, some in color, of odd scenes he filmed during his trip.

Yachting, and a vivid description of some recent races, was covered by Mr. Davis in his talk. Having covered practically all of them, including the Ranger-Endeavor races, his talk was vivid and well received.

CHICAGO GROUP HOLDS FIRST FALL MEETING

Over 125 members and guests attended the first Fall meeting of the Chicago Group, Rubber Division, A.C.S., held on September 24 at the Hotel Sherman in Chicago. The major speaker of the evening was Carl Zieme, service engineer of the Republic Rubber Company, Youngstown, Ohio.

Selecting the "Industrial Applications of Rubber" as his topic, Mr. Zieme reviewed the subject of crude rubber from the time it leaves the plantation until it reaches the compounding room ready for processing. He pointed out the characteristics of rubber which are taken advantage of in the manufacture of certain mechanical goods, and then went on to explain the different types of procedure best adapted to the vulcanization of these mechanical goods, the procedures varying with the type and shape of the product as follows:

(1) Solid molded products are vulcanized in steel and metal molds under high pressure, this method permitting the rubber to flow into the most intricate cavities.

(2) Belts and sheet packing are vulcanized generally in heated platen presses.

(3) Other types of sheet packing are tightly wrapped between fabric liner and vulcanized in hot water or steam under pressure in an open heater.

(4) Vulcanization of hose varies with its construction, *i.e.*, wrapped hose built upon steel mandrels is tightly wrapped with tape and subjected to steam in a heater, while pressure in braided hose is applied internally with water or air, and cotton rubber lined hose is vulcanized internally by filling it with steam under pressure.

Pointing out the important part played by mechanical rubber goods in the construction of Boulder Dam, Grand Coulee, and other large undertakings, Mr. Zieme showed many slides of pictures taken of these works under construction. In his talk, he also stressed the part the synthetic rubbers are playing in the production of mechanical goods.

The second feature of the meeting was a motion picture of Africa, presented by Herbert Bradley, noted explorer. The picture showed the life of the natives and included some unusual geological formations across Africa, from East to West, near the equator. Mr. Bradley is a director of the Brookfield Zoological Gardens, near Chicago.

The next meeting of the Chicago Group will be held at the end of October, according to Ben W. Lewis of Wishnick-Tumpeer, Inc., secretary.

Coming Events

Oct. 18-20. National Association of Independent Tire Dealers, Hotel Stevens, Chicago, Ill.

Oct. 22-23. Ninth Annual Meeting of the Society of Rheology, Hotel Mayflower, Akron, Ohio.

Oct. 27-Nov. 3. National Automobile Show, Grand Central Palace, N.Y.C.

Nov. 2. Los Angeles Group, Rubber Division, A.C.S., Mayfair Hotel, Los Angeles.

Dec. 5-11. Exposition of Chemical Industries, Grand Central Palace, New York City.

Apr. 18-21, 1938. Spring Meeting, American Chemical Society, Dallas, Texas.

May 23-25, 1938. International Rubber Conference, London, England.

An index to Volume 41 of THE RUBBER AGE will be found facing page 74 of this issue.

LOS ANGELES GROUP RESUMES MEETINGS

Ninety-four members and guests attended the first monthly supper meeting of the new season of the Los Angeles Group, Rubber Division, A.C.S., held in the main dining room of the Mayfair Hotel in Los Angeles, on October 5. T. Kirk Hill, chairman, presided.

Al Sperry, president of the "Dunkers' Union", in a spirited talk explained the advantages of membership in his organization. This talk went over in fine shape. Rex Thomson, Superintendent of Charities, spoke on the theme, "California Here I Come!", dealing with the heavy problems of charity programs in California because of constant immigration of indigents from other parts of the country. A talking picture in color, "Ceiling Unlimited," picturing the development of aviation, was shown. E. H. Lewis, vice president of Western Insulated Wire, Inc., a new insulated wire manufacturing company in Los Angeles, spoke on "The Newest Pacific Coast Rubber Product."

Moving pictures of the summer deep sea fishing trip taken by Ed Royal were shown, depicting the world's most efficient fishermen in their most effective professional poses.

An employment committee, the function of which will be to aid rubber industry workers in securing jobs in the future, was organized. This is a new committee. A nominating committee was also named to present at the next meeting a slate of nominees for the group's offices for the ensuing year. The election will take place at the December meeting.

The door prize was donated by Lee Horchitz of the B. F. Goodrich Company, and a special prize was donated by William C. Holmes of the Dill Manufacturing Company.

An active drive for increased membership is planned and a year of instructive and entertaining programs is promised. The next meeting will be held on Tuesday evening, November 2, in the Rainbow Room at the Mayfair Hotel.

Studying Synthetic Rubber

Czechoslovakia has launched an intensive study of synthetic rubber manufacture and is expected to start production in the early future, probably using the Russian method, according to the Minister of Agriculture of that country. At the outset only a small trial plant is contemplated since the performance of synthetic rubber produced by the Russian process is practically an unknown quantity in view of the fact that little of the product has been seen or tried in countries outside Russia. If the synthetic rubber manufactured stands up in performance, it is the intended ambition of the Czechoslovakian government to produce sufficient quantities to meet the home demand for rubber. The experiment will be carefully watched by other small countries.

DETROIT GROUP HOLDS ITS OFFICIAL MEETING

The first official meeting of the recently-organized Detroit Group, Rubber Division, A.C.S., was held at the University Club in Detroit on September 29. Approximately 130 members and guests were present. The program featured talks by William Nelson of U. S. Rubber Products, Inc., and E. B. Curtis of the R. T. Vanderbilt Company. An unexpected speaker was a Mr. Wilson of the Rubber Growers' Association, in this country on an extended visit.

After an excellent dinner, the program was launched by Mr. Nelson who discussed the "Physical Testing of Rubber." In all, he described and illustrated with slides 10 major tests practiced by U. S. Rubber, including abrasion, flexing, compression, tread and pressure. He also showed data pertaining to these tests.

The second speaker, Mr. Curtis, delivered a non-technical address on the trials and tribulations of a rubber chemist. His talk was studded with anecdotes selected from an interesting career, and was brimful of humor. Mr. Wilson's talk was short and mostly concerned the relationship between crude rubber producer and user.

It was decided at the meeting that the Detroit Group would play host to the Rubber Division of the A.C.S. when it holds its meeting in Detroit next Spring.

New York Group Meeting

As this issue went to press, the New York Group, Rubber Division, A.C.S., was scheduled to hold its first Fall meeting on October 15, at the Building Trades Club, New York City. Two papers were to be heard, one by Dr. W. C. Geer on "The Necessity for Cooperative Research in the Rubber Industry" and the other by D. C. McRoberts on the "Development and Application of Kaysam." An entertainment program was also scheduled. A full report of this meeting will appear in our next issue.

Holds Sales Convention

D. H. Litter Company, Inc., manufacturers sales agents, held a two-day sales convention at the Chemists' Club in New York City on October 1st and 2nd. The entire sales forces of the Philadelphia, Boston and New York offices, as well as laboratory workers, were present. An excellent meeting was reported by Ralph B. Huber.

Appeal F.T.C. Decision

The appeal of the Goodyear Tire and Rubber Company, Akron, from the decision of the Federal Trade Commission, pertaining to its contract with Sears, Roebuck & Company, in which a "cease and desist" order was entered against Goodyear, was heard by the Circuit Court of Appeals in Cincinnati on October 5.

FARM TIRE USES EXPLAINED TO ENGINEERS

P. W. Litchfield, S. B. Robertson and J. W. Thomas, at the S.A.E. Tractor Section dinner.

Rubber, and its uses on farm tractors and implements, was the major topic of the three-day regional tractor meeting held by the Cleveland Chapter of the Society of Automotive Engineers, on September 15-17, at the Mayflower Hotel in Akron. Papers on rubber subjects were delivered by J. K. Kreyer of Firestone, R. P. Gaylord of Goodyear, J. G. Swain of Goodyear, H. W. Delzell of Goodrich, and A. W. Bull and M. K. Jessup, of U. S. Rubber Products, Inc., Detroit, Michigan.

Mr. Kreyer launched the opening session, discussing conditions affecting the life and some special uses of agricultural tractor tires. He stressed the need of keeping tires inflated to recommended pressures, preventing contact with oil and grease, and urged immediate repairing of cut or damaged tires.

In his talk, Mr. Delzell told of the use of water in farm tractor tires and described exhaustive tests which demonstrated eight advantages of such applications over metal weights, including economies attained. He also revealed that the search to find some inexpensive anti-freeze to use with the water in the colder regions of the country, to prevent the water from freezing, resulted in the use of ordinary commercial flake calcium chloride.

Discussing the most efficient use of rubber-tired tractors for heavy farm work, Mr. Gaylord, who is in charge of tire testing for Goodyear, said that the major problem is that of securing traction for such jobs as plowing. He suggested two solutions to this problem, *i.e.*, to load down the drive wheels of the rubber-tired tractor until sufficient traction is secured, although in some cases this action is prohibitive, or to increase the speed and reduce the drawbar pull required, thus utilizing the full horsepower and obtaining a greater amount of work per hour.

Important developments in the field of rim manufacture contributing to increased use of farm tractor and implement tires were outlined by Mr. Swain. He stated that there is a definite trend at present toward the use of the semi-drop center rim and predicted that the mutual experience of the tractor manufacturers and the tire makers will eventually result in a rim standardization best suited to all concerned.

New methods of testing tractor tires with the aid of motion pictures were explained by A. W. Bull and M. K. Jessup. They demonstrated their paper with projection of films made in the field. Essentially, the method consists of taking motion pictures of various instrument dial readings at the rate of 16 exposures per second during test runs.

A banquet under the auspices of the Cleveland Chapter of the S.A.E was held on the evening of September 16 at the Mayflower Hotel, during which brief speeches were made by P. W. Litchfield, S. B. Robertson and J. W. Thomas, presidents of Goodyear, Goodrich and Firestone, respectively. All three executives predicted the opening of vast new markets for tires with the continued expansion of the use of tires on the farm. They also stressed the advantages accrued by the farmer by the use of rubber-tired equipment.

Support of the prediction that a majority of tractors produced in 1938 will be equipped with rubber tires is given by the brief five-year history of the tractor tire industry which equipped 5% of tractors sold in 1933; 7% in 1934; 10% in 1935; 20% in 1936; and approximately 45% in the current year.

1937 Football Guide

The General Atlas Carbon Company, New York City, has issued its 1937 edition of Grantland Rice's "Gastex Football Guide." This is the third guide presented by the company. General Atlas is also continuing its mailing campaign in which small booklets point out special advantages of the company's carbon black. Recent titles included "Tough" and "Growth".

NEW ENGLAND NEWS

Although production has been reduced from the peak of July, when 1,500 hands were employed as against 1,100 in September, operations of A. G. Spalding & Bros., Chicopee and Willimansett, Mass., continue at a good level, ahead of last year. The current year is described as a good one from the standpoint of sporting goods sales. The high July employment total was due to the transfer of several lines of production from Philadelphia, Brooklyn and Chicago.

The company is manufacturing a number of sponge rubber specialties which are sold through the jobbing trade by the Merchants and Manufacturers Company of Springfield, Mass. An outstanding item is an ice pack employing flexible sponge rubber bands comprising members filled with water frozen in a refrigerator and made available for medical and hospital uses. The packs are designed to be securely fastened about the head, arm or leg, and have been adapted for use in beauty parlors, dentists' offices, and elsewhere.

Broom mops, window cleaners and a stopperless hot water bottle are made of the same material, and a newly patented device combines a flexible rubber mop and squeegee, one agent replacing the other by a quick reversal of the position of the two members.

Norwalk Tire & Rubber Company, Norwalk, Conn., has declared a payment of $3.87 a share arrearage on cumulative dividends on preferred stock, payable September 24. The last previous payment was 50 cents a share on October 1, 1935.

Jenkins Bros., Bridgeport, Conn., has declared a payment of 25 cents a share on non-voting and $1 on founders' shares, both payable October 2 on stock of record September 23.

United States Rubber Products, Inc., Naugatuck, Conn., curtailed production of Keds as of October 11. It was announced that unless new orders were received, one of the making units in the waterproof department would be dropped. A slight curtailment was expected in the gum shoe department, with all other waterproof departments expected to continue on present schedules, according to Walter H. Norton, factory manager.

A. J. Donahue Corp., Milford, Conn., manufacturers of elastic webbing products, has awarded contracts for erection of a new machine shop on Factory Lane, to be 25 x 100 feet, of frame construction, costing $7,000.

United States Rubber Products, Inc., Naugatuck, Conn., has been awarded an $11,155 contract for boots for the War Department, according to recent advices from Washington.

Fisk Rubber Corp., Chicopee Falls, Mass., is slowly taking back the employees who were laid off for the slack season. It was announced recently that more than 100 of the 400 idle had been restored to the payroll. The local United Rubber Workers union voted to adopt a 30-hour week in order to spread available work as much as possible.

Fisk directors on September 30 voted a quarterly dividend of $1.50 per share on preferred stock of the corporation, payable October 20 to stockholders of record October 11.

Kenneth Epstein, C.I.O. organizer, announced on October 2 that he had filed charges with the National Labor Relations Board at Boston against the Paragon Rubber Co., Easthampton, Mass. He accused Marvin Jaffe, manager, of interfering with the rights of workers to organize.

Carbon Output Sets Record

The carbon black industry in the United States established a new high for production, domestic sales and export in the year of 1936, according to a report issued by the Bureau of Mines. Production totalled 411,345,000 pounds, a gain of 8% over the peak reached in 1930 and 17% more than the the poundage reported in the previous year. Demand totalled 467,736,000 pounds, a gain of 21% over the 1935 figure. Stocks were materially reduced at the various plants, reaching approximate working levels by the end of the year. Domestic sales in 1936 reached 278,018,000 pounds, 67% of the complete production.

FORMULATING PLANS FOR LONDON MEETING

A tentative program for the Rubber Technology Conference to be held under the auspices of the Institution of the Rubber Industry on May 23-25, 1938, in London, has been prepared. The principal part of the conference will be a symposium on methods of improving and evaluating the durability of rubber, while several general subjects will compose the balance of the meeting.

The symposium will be divided into three sections: (a) Manufacturing Conditions, including Compounding; (b) Uses of "Synthetic Rubbers" and Allied Plastics; and (c) Testing Methods, including Chemical, Physical, Performance and Accelerated Aging Tests.

The general subjects have been temporarily divided into seven classifications: (1) Chemistry and Physics of Latex and Rubber; (2) Technology of Latex and Rubber; (3) Rubber Derivatives and their Uses; (4) Raw Materials of the Rubber Industry, (5) Manufacture of Particular Goods; (6) Machinery and Appliances—Steam and Heat; and (7) Organization and Administration.

Special instructions for the authors of papers have been prepared and copies of these instructions may be secured by addressing W. F. V. Cox, Secretary, Institution of the Rubber Industry, 12, Whitehall, London, S.W. 1, England. The Rubber Division of the American Chemical Society is lending all possible assistance to the success of the conference, which will be international in scope. Dr. A. A. Somerville of the R. T. Vanderbilt Company, New York City, is chairman of the American Committee of Arrangements for participation in the conference, while Dr. A. R. Kemp of the Bell Telephone Laboratories, New York City, will pass on American papers to be presented at the meeting.

TRENTON NEWS

Employees and officials of the Vulcanized Rubber Company, Morrisville, Penna., have signed a three-month wage and hour agreement, providing for 44 working hours a week, and minimum wages of 35 cents an hour for women and 40 cents an hour for men, with time and a half for overtime, Sundays, and holidays. In addition, lay-offs will be based only on seniority, and there will be a week's vacation with pay for all employees who have had four years of service.

Somerset Rubber Company, East Millstone, N. J., rubber reclaimers, are operating three shifts a day, seven days a week.

The Technical Committee of the Rubber Manufacturers' Association of New Jersey held a two-day session in September at the Trenton Country Club. H. M. Frecker of United States Rubber Products, Inc., was in charge.

Thermoid Company, Trenton, plans to erect a one-story factory addition, to cost approximately $30,000. The building will supply an additional 30,000 square feet of shipping and storage space.

Near Para Rubber Company, Trenton, is installing new equipment and machinery to meet the increased production demands anticipated for the Fall and Winter trade.

The Brunswick Rubber Company, New Brunswick, has purchased some of the equipment of the Dural Rubber Company, Flemington, N. J., and will use it in the manufacture of drug sundries.

ANNOUNCE WINNERS OF SAFETY CONTEST

Winners of the 1937 Rubber Section Safety Contest, sponsored by the Rubber Section of the National Safety Council, were to be announced during the 26th National Safety Congress and Exposition, currently being held in Kansas City, Missouri (Oct. 11 to 15). Bronze trophies were to be given to first place winners and certificates for second and third honors.

Thirty-seven participating plants worked 63,696,394 man-hours during the six months' period of competition and experienced 642 disabling injuries for an accident frequency rate of 10.079 disabling injuries per one million man-hours. The 37 plants employed 67,874 men. Both the accident frequency rate and man-hours of exposure were higher than for all previous contests.

Plants averaging 125,001 or more man-hours per month, composing Groups A and B, made the best records in the contest with an average frequency rate of 10.05. Groups C and D, composed of plants with 125,000 or less man-hours of exposure per month, had an average frequency rate of 10.424. Two-thirds of the plants in both divisions had frequency rates below the averages.

No-injury records for the entire contest period were made by four plants. Seven of the 22 large plants in Groups A and B had frequency rates below 2.00 for the contest period. Where two or more contestants tied for first place in any group without a disabling injury, these perfect records resulted in equal rankings and awards.

Winners in Groups A and B, representing 125,001 or more average monthly man-hour exposure, were the Naugatuck (Conn.) and Mishawaka (Ind.) plants of U. S. Rubber Products, Inc., and the Kitchener (Ontario) plant of the Dominion Rubber Co., Ltd., a subsidiary of U. S. Rubber Products, Inc. Four plants, with perfect records, were tied for first place in Groups C and D, representing less than 125,000 average monthly man-hour exposure, *i.e.*, Lobl Manufacturing Company, Middleboro, Mass., Providence Insulated Wire Company, Pawtucket, R. I., Fabric Fire Hose Co. (An affiliate of U. S. Rubber Products, Inc.), Sandy Hook, Conn., and Van Cleef Brothers, Chicago, Ill. All of these concerns were awarded trophies or certificates in accordance with the contest.

Form Lower Rubber Co.

The Lower Rubber Manufacturing Company has been organized by S. M. Lower, production manager of the Sun Rubber Company, Barberton, Ohio, and his brother-in-law, J. S. Baughman, of the same company. The new concern, which will specialize in the production of molded rubber toys and other small articles, will be located in Ravenna, Ohio. Ground for a new factory has already been broken. The factory will cost approximately $50,000. When completed, approximately 75 workers will be employed.

Goodrich Research Men

The University of Illinois has contributed 27 technical aids to the staff headed by J. W. Schade, research director of the B. F. Goodrich Company, during the past 13 years, four of whom were recently appointed. Next in the order of supplying technical men to Goodrich is Purdue, with 18 graduates hired, University of Missouri with 14, University of Minnesota with 13, Harvard with 11, and Ohio State with 10. Iowa State, Kansas, Carnegie Tech, M. I. T., Johns Hopkins, Yale and Georgia Tech, are other colleges and universities which are represented on the Goodrich technical and research staff.

COMMITTEE STUDIES NEW TIRE STANDARDS

More than fifty delegates from nine countries attended a meeting of Technical Committee 31 on Tires, Rims and Tire Valves of the International Standards Association, held recently in London, England. R. T. Brown of the Goodyear Tire and Rubber Co., Akron, Ohio, and H. A. Brittain of the Goodyear Tyre and Rubber Co., Ltd., Wolverhampton, England, were members of the American Delegation. The following subjects were considered at the meeting:

Private Cars—well base rims not exceeding 16 inch diameter; well base rims 17 inches in diameter and over; size and location of valve hole for given tire and rim fitments; maximum cross sectional dimensions of tires fitting rims not exceeding 16 inch diameter; loads and inflation pressures; rubber valves.

Commercial Vehicles—loads and inflation pressures; flat base rims 16 inches in diameter and over; maximum cross sectional dimensions of tires fitting rims 16 inches in diameter and over; size and location of valve hole for given tire and rim fitments.

Motorcycles and Bicycles—rims, tires and valves for both motorcycles and bicycles.

Prior to the meeting, the delegates visited the research laboratory of the Institution of Automobile Engineers. The Society of Motor Manufacturers and Traders, which acts as secretariat for this technical committee, was host at the meeting.

Goodrich "Hi-Cleat" Tire

B. F. Goodrich Company, Akron, has announced a new tractor tire, designed particularly for use in rice and sugar cane fields, known as the "Hi-Cleat" tire. The new tire has been engineered to give maximum traction in soft muddy fields and has a tread composed of cleats 2½ inches high. It will also give smooth riding and resistance to wear on hard surfaces, according to Goodrich engineers.

SEEK TO REORGANIZE OVERMAN TIRE FIRM

The Overman Cushion Tire Company, Inc., 30 Rockefeller Plaza, New York City, with factory at Belleville, N. J., filed voluntary proceedings to reorganize under Section 77B of the Bankruptcy Law in the United States District Court for the Southern District of New York on September 13. The petition listed liabilities of $508,741 and assets of $708,794.

In approving the petition, the District Court permitted Overman to continue to operate its factory and business as heretofore, pending further notice. At the same time a hearing was ordered to be held on October 13 in the United States Court House at Foley Square in New York City. The purpose of the hearing (results of which will be given in the next issue) was to determine whether Overman should continue in possession or whether the Court should appoint a trustee or trustees.

Several creditor committees have been organized, one headed by David D. Carroll of the Marlboro Cotton Mills, for which the law firm of Krause, Hirsch and Levin, 225 Broadway, New York City, is counsel, and another by Jacob Handelsman of 1775 Broadway, New York City. Companies interested in the reorganization proceedings include the Marlboro Cotton Mills, Charles T. Wilson Co., National Rubber Machinery Co., R. T. Vanderbilt Co., Godfrey L. Cabot, Inc., and the St. Joseph Lead Co.

Max Cyrus Overman is president of the Overman Cushion Tire firm, the attorneys for which are Kadel, Van Kirk and Trencher, 122 East 42nd Street, New York City.

Columbian Carbon Sales Gain

Due to continued demands from the rubber, paint and ink fields, sales of carbon black by the Columbian Carbon Company, New York City, this year have been running about 28% ahead of 1936, it is reported. If this rate is maintained for the balance of the year, the company's production of carbon black for 1937 will reach a total of approximately 135,000,000 pounds. Total output last year was 106,236,000 pounds.

Canadian Prices Advance

Prices have been advanced from 2½% on all small sizes and grades of tires, and from 7½ to 10% on all larger sizes and grades, in the Canadian market. The increase means an average of $1.50 more per tire for the smaller cars and averages of from $6 to $7 and from $10 to $11 on truck and bus tires, depending on size and grade. The increases were made necessary by advancing prices of raw materials and wages.

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LOS ANGELES NEWS

Charles Lamb, vice-president of the West American Rubber Company, Inc., and his wife, are on an extended tour of the East and South. Cities to be visited on the tour include New York, Buffalo, St. Louis, and Houston. At the last named city the Lambs were to attend the annual oil convention. Mr. Lamb contemplated purchasing several new pieces of machinery for installation in the Los Angeles factory.

The Re-Nu Battery Sales Corporation has been organized, with offices at 719 Oviatt Building, headed by A. J. Kruse, to take over the sales department of the J. H. W. Corporation, a company formed some months ago to manufacture a new type of battery, one with an absorbent packing which prevents the spilling of liquids from the cells regardless of the position in which the battery happens to be placed. C. S. Hoss is vice-president of the sales corporation. O. W. Weidler heads the manufacturing corporation, located at 3762 Beverly Boulevard.

Frank Dalton, president of the D. and M. Machine Company, has returned from a yachting cruise which took him into north Canadian and Alaskan waters.

The Darnell Corporation, Long Beach, has completed the installation of a new testing laboratory. A new frame building, 20 by 50 feet, was erected for the purpose and equipment is complete for the purposes required. Carl E. Stentz, secretary and treasurer of the Los Angeles Rubber Group, is in charge. The rubber factory of this company has also been enlarged recently. About 3,500 square feet have been added to the floor space all told and several new pieces of machinery installed.

E. H. Lewis is vice-president and general manager of a new company which will manufacture insulated wire under the name of Western Insulated Wire, Inc., at 1001 East 62nd Street, Los Angeles. The president is A. D. Nast, Jr. The factory is now being put in order and the plan is to get under production by November 1. About 22,000 feet of floor space will be occupied. This possibly is the first factory of its kind West of Chicago. While the sales effort will at the beginning be concentrated on the Pacific coast plans involve a nation-wide sales program.

Mr. Lewis was formerly designing engineer in charge of engineering for the wire and cable division of the General Electric Company at Bridgeport, Connecticut, and was also with the Hatfield Wire and Cable Company at Hillside, New Jersey. Mr. Nast was formerly a member of the firm of Sickle, Heath and Nast, Inc., a Chicago investment corporation. Rubber insulated wire of all sizes will be manufactured.

Invite Puerto Rican Labor

Puerto Rico's overpopulation and unemployment can find some relief in emigration, according to C. A. Pringle, general administrator of the Ford Rubber plantations in Brazil. Mr. Pringle, in a letter to the Labor Commissioner of Puerto Rico, suggested that 500 laborers emigrate to the Brazilian plantations, half of them to be accompanied by their families. It is not yet known whether the offer will be accepted.

Enlarge Lima Sole Factory

Enlargement of the factory of the Lima Cord Sole and Heel Company, Lima, Ohio, was undertaken last month. The expansion, which will cost approximately $30,000, was necessary because of increased business, according to Frank L. Maire, president of the company, who added that some 50 more workers will be hired.

New German Reclaiming Plant

The Deutsches Gummiregenereierungswerk W. Golumbek has started the construction of a new large rubber reclaiming factory near Hamburg, Germany. It is stated that a new reclaim process will be used in the plant when completed, although no details were announced.

Ohio Rubber Expanding

Plans have been completed for the construction of a new $60,000 building at the plant of the Ohio Rubber Company, Willoughby, Ohio, according to R. A. Mertz, factory manager. The new building will be of brick and concrete construction, approximately 40 x 40 feet in size, and will be used for storing compounds and raw materials when completed. The company is currently employing approximately 1,000.

Automobile Show to Open

The annual National Automobile Show will open on October 27 and will run to November 3. As usual, the site is the Grand Central Palace, in New York City. One of the features of the show will be an augmented driver-testing clinic under the auspices of the Automotive Safety Foundation and the Harvard Bureau for Street Traffic Research.

Columbian Insures Employees

A comprehensive insurance plan covering all of its employees and those of its subsidiaries has been adopted by the Columbian Carbon Company, New York City. The entire cost will be assumed by the company, it is announced.

16-INCH TIRE SIZES PROVING POPULAR

The automobile dealer has never before enjoyed the simplification of general tire requirements as at present. More cars are using 16-inch tires than ever before, that size now being standard on Ford, Plymouth and Chevrolet, in addition to several of the higher-priced, heavier models, according to a recent issue of *Automotive Daily News*.

It is estimated that on the basis of 1936 production more than 3,000,000 cars of the total of 4,404,497 actually registered left the factories with 16-inch tire equipment, which, according to Department of Commerce figures, means that original equipment called for approximately 15,000,000 tires. Of the cars registered up to April 30 of this year, approximately 750,000 cars were shipped with about 3,500,000 16-inch casings. On the basis of replacements to date, dealers who sold the original cars should have a market for approximately 5,000,000 tires.

The change toward standardization is revealed in the statistics for the past few years. In 1934 approximately 20% of the cars registered carried 16-inch equipment; in 1935 it was increased to about 40%; the following year it jumped to 55%; and by the end of the current year the percentage is expected to reach 75%.

Although there is a tendency on the part of automobile manufacturers to make smaller wheels, the popularity of the 16-inch tire is expected to hold good for several years to come. Standardization of tire sizes is of special benefit to the small dealer, since he is not required to carry the multiplicity of sizes heretofore necessary to service replacements.

Financial News

Dayton Sales Increase

Sales of the Dayton Rubber Manufacturing Company, Dayton, Ohio, for the first nine months of the company's fiscal year to July 31, totaled $6,239,672, a gain of 25.2% over the sales of $4,980,678 reported for the corresponding period of the previous fiscal year. Earnings in the same comparison are making an even better showing, according to J. A. MacMillan, chairman of the board.

Baldwin Rubber Company

Seven months to July 31: Net profit of $365,275, after all charges but before provision for the Federal surtax on undistributed profits, equal to $1.31 a share on 278,604 shares of $1-par common stock, not including treasury stock.

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ISSUE FINAL REPORT ON INDUSTRY FOR 1935

The final report on the rubber industry covering the year of 1935 has been completed by the Bureau of the Census. The report states that the total value of rubber products manufactured domestically in 1935 amounted to $671,721,681, of which $7,776,566 was reported as being secondary products of firms not classified in the industry.

The total value of tires and tubes produced was $374,264,436 ($3,916,962 above the preliminary report), or 55.8% of all rubber goods; rubber boots and shoes $48,261,613 or 7.2%; and all other products $249,195,632 or 37.1%. These tire percentages do not include "tire sundries and repair materials," which with camelback were produced to the value of $14,035,000 in 1935; including this with tires and tubes accounts for 57.8% of the 1935 total value of products, much less than in 1929.

The revised total production reported for reclaimed rubber was approximately 110,000 long tons. The total consumption reported was 113,625 long tons, of which 37,404 long tons were reclaimed and consumed in other products of the same firms. Considering exports of 5,383 tons of reclaim in 1935, stocks must have been reduced noticeably; the reduction estimated as a result of the survey conducted by the Leather and Rubber Division was 3,000 tons. The above census data on reclaim is believed somewhat incomplete, "consumption" not covering firms in the "insulated wire industry," for example.

A statistical summary for the Akron industrial area, for 1935, has also just been released by the Census Bureau. The 20 rubber establishments in the area accounted for 76.8% of the employment there, 79.9% of the wages paid, and 78.8% of the values of products. The six tire companies in the area accounted for 64.3% of employment in the entire domestic tire industry, 69.8% of the wages, 57.1% of the cost of materials, 63.4% of the value of products, and 72.7% of the value added by manufacture; these percentages appear to indicate high wages and low material costs in the Akron area in 1935 compared to the tire industry as a whole.

Investigating U. S. Rubber

The Federal Trade Commission has ordered an investigation into the sales and price policies of U. S. Rubber Products, Inc., to determine whether there is any violation of the Robinson-Patman anti-price discrimination act. It is understood that investigators are already in New York where detailed examination is to be made to ascertain whether the distribution of tires through the U. S. Tire Dealers Mutual Company is a means by which the statute prohibiting price discrimination is being indirectly violated. The primary interest of the government is said to lie in the operation of the sales policy of the mutual plan.

Improved Rush-Eraser

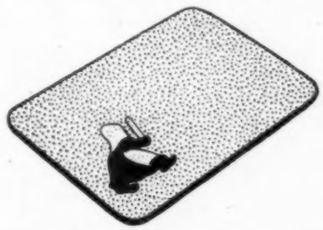
The Eraser Company, Inc., Syracuse, New York, has introduced an improved model of its Rush-Eraser.

These erasers consist of metal barrels, at the ends of which are inserted special "brushes" suitable for different erasing purposes. One such "brush" is termed Rubberglass, suitable for erasing ink or typewriting from soft papers. This "brush" is made principally of rubber with ground glass being used as an abrasive for its cleansing qualities. Another "brush" is called Fiberglass, suitable for erasures on hard surfaced papers. This type is composed of spun glass fibers held together loosely with a rubber compound.

Old Dutch Rubber Premiums

The Cudahy Packing Company, Chicago, is using a rubber sponge and a sponge rubber bath mat as premium

items in connection with the sale of its Old Dutch Cleanser. The sponge is die-cut in the shape of the familiar Old Dutch trade-mark and is supplied in green and white and blue and white styles. The sponge rubber mat is reversible, green in color, and features the same familiar trade-mark on one surface. It is 14½ x 23 inches



in size and harmonizes with modern bathrooms. Both items are said to have brought satisfactory results to the company.

WRIGHT VISUALIZES NEED FOR PLANTING

R. M. Wright, one of England's crude rubber experts, recently stated that restriction has already achieved its avowed object, *i.e.*, reduction of stock and raising of prices to a profitable level for the producer, but now that this object has been achieved continuance of the scheme has come to be regarded as a practical necessity by those connected with the producing industry.

Even should world consumption overtake production the scheme with its smooth working machinery should not be scrapped, in the opinion of Mr. Wright, but should be retained as an auxiliary to the industry. Restriction's next big step is to provide sufficient available rubber to meet world demand. In this respect, he pointed out that the basic quota of all signatory countries is only 36,750 tons greater for 1938 than for the current year. He also made the following statement:

"Bearing in mind that a period of six years must elapse between planting rubber and harvesting its first modest crop, with a further four years before it attains full production, one would have thought the Committee would have worked out some scheme for controlled planting in order to have a reserve supply of the commodity at hand against the time when world consumption should have over-topped production from already-planted areas. . . . It should not be a difficult matter for the Committee to authorize each producing country to plant up so many acres yearly, leaving apportionment of such acreages as a domestic matter of each country."

New Labor Difficulties

Two hundred and forty employees of the Seiberling Latex Products Company, Barberton, Ohio, returned to work on September 27 after reaching an agreement with the management following a five-week strike. The agreement bans strikes, sit-downs and lock-outs during future negotiations, according to A. E. Sidnell, factory manager of the company. In the meantime strikes broke out at both the Bowling Green Rubber Company, Toledo, Ohio, where employees demanded a 10% wage increase, and at the R. H. Schwartz Rubber Company, Cleveland. In the latter case an employee election to select the sole collective bargaining agency has been arranged. The strike went into effect on September 25. Employees of both Goodyear and Goodrich on the Pacific coast have selected the U.R.W.A. as sole bargaining agency, determined by employee elections. There now exists a possibility that a rival rubber union to the U.R.W.A., affiliated with the C.I.O., may be started by the American Federation of Labor. This threat was voiced by William Green, head of the A. F. of L., at a recent convention.

Obituaries

Harold T. G. van der Linde

Harold Theodore G. van der Linde, president of Harold van der Linde, Ltd., Toronto, Ontario, Canada, died recently at Toronto at the age of 76. He had been in poor health for several years.

No single individual was said to be more instrumental in the development of the rubber and chemical industries in Canada. Born in Plymouth, England, in 1861, Dr. van der Linde studied medicine at the University of Edinburgh, but became so strongly attached to the chemical side of the profession that upon graduation he devoted his energies toward industrial chemistry. His early associations with the United States and Canada arose through his contacts with Thomas A. Edison, whom he represented between 1888 and 1893. During this period he was employed at Peterborough and Sherbrooke, Ontario, both now centers of electrical equipment manufacture. Becoming familiar with rubber during his service with Edison, Dr. van der Linde opened the first laboratory associated with the Canadian rubber industry in 1893 at the plant of Gutta Percha and Rubber Co., Ltd., at Toronto. He remained with this organization until 1909 during which period he made a number of original contributions to the rubber industry, particularly on processes for reclaiming rubber. From 1908 to 1914, a period when the world was being searched for new sources of rubber supply, Dr. van der Linde acted as technical director for several plantation rubber concerns, including the Continental Rubber Co. of New York, Continental Mexican Rubber Co., Rubber Exploration Co., American Congo Co., and the Century Rubber Co. Spending several years in Mexico with a group of young chemists, he is given credit for reducing the production of rubber from Mexican natural resources (such as guayule) to an economic reality.

The unpredictable political situation ever present in turbulent Mexico caused his subsequent withdrawal from the field. Returning to Canada, he initiated the synthetic resin business as an industry, opening a plant in 1914 in Toronto. Shortly thereafter the van der Linde Rubber Company was formed and produced tires and tubes for a number of years. For the past ten years, his interests were mostly confined to the supplying of raw materials and chemicals to the Canadian rubber industry through Harold van der Linde, Ltd. Although president of this organization at the time of his death, Dr. van der Linde's health for a number of years had not permitted daily active participation in the affairs of the concern.

Charles J. Stutson

Charles J. Stutson, one of the best known salesmen in the drug sundries and toy and novelty fields, died in Columbus, Ohio, on September 15. He had been in poor health for the past three years. He was 54 years old at the time of his death. Mr. Stutson was one of the first three salesmen to travel for the Miller Rubber Company, joining that concern in 1906. He served with Miller until his retirement from active business in 1934, with practically the entire country as his territory. Funeral services were conducted on September 16, with interment in Columbus. He leaves a widow and a son.

P. H. Hart

P. H. Hart, an official of the Equitable Life Assurance Company, New York City, and one-time treasurer of the Goodyear Tire and Rubber Company, died in Montreal, Canada, on September 18. He was 45 years of age. Mr. Hart was born and educated in Montreal and moved to Akron when he joined Goodyear. After leaving Goodyear he joined the New York office of the Assurance Company.

Soviet Natural Rubber

After several years of research, the Kauchukonos (rubber-bearing plant) Trust of the U. S. S. R. will shortly begin the production of natural rubber on an industrial scale, according to advices from abroad. *Kok-Saguiz* has been chosen as the major rubber-bearing plant for large scale development. This plant is now being cultivated in 13 different provinces of the country, being grown under artificial irrigation in Kazakhstan and Central Asia. By the end of 1936 an area of approximately 13,175 acres was sown to *Kok-Saguiz*. By the end of the current year this acreage will be increased to 45,000 acres.

AUGUST CONSUMPTION IS 5% UNDER JULY

Consumption of crude rubber by manufacturers in the United States during the month of August is estimated to be 41,456 long tons, which compares with 43,650 long tons during July. August consumption shows a decrease of 5% under July and is 11.4% under August a year ago according to statistics released by the Rubber Manufacturers Association. Consumption for August, 1936, was 46,777 (revised) long tons.

Gross imports of crude rubber for August were reported to be 48,785 long tons, an increase of 24.7% over the July figure of 39,108 long tons and 14.6% over the 42,562 long tons imported in August, 1936.

Total domestic stocks of crude rubber on hand August 31 are estimated at 171,052 long tons, which compares with July 31 stocks of 164,445 long tons and 230,167 (revised) long tons on hand August 31, 1936.

Crude rubber afloat to United States ports as of August 31 is estimated to be 80,439 long tons which compares with 75,779 long tons afloat on July 31 and 63,597 long tons afloat on August 31 a year ago.

August reclaimed rubber consumption is estimated at 14,670 long tons; production at 15,289 long tons; and stocks on hand on August 31, at 18,299 long tons.

JULY TIRE SHIPMENTS ARE 3.7% UNDER JUNE

Shipments of pneumatic casings during the month of July, estimated at 5,190,107 units, show a decrease of 3.7% under June, and were 9.6% under shipments made in July, 1936, according to statistics released by the Rubber Manufacturers Association.

Production of pneumatic casings for July is estimated at 4,291,660 units. This is a decrease of 19.6% under June and 21.5% below July, 1936.

Pneumatic casings in the hands of manufacturers July 31, 1937, are estimated at 11,654,114 units, a decrease of 7% under the stocks on hand June 30, but 50.4% above stocks on hand July 31, 1936.

The actual figures are:

PNEUMATIC CASINGS

	Shipments	*Production*	*Inventory*
July, 1937	5,190,107	4,291,660	11,654,114
June, 1937	5,389,274	5,339,238	12,528,789
July, 1936	5,743,867	5,466,252	7,749,847
July, 1935	5,447,109	3,531,834	8,849,503

Alhambra Rubber Moving

The Alhambra Rubber Company, Fostoria, Ohio, manufacturers of surgical and other types of gloves, has begun to transfer its operations from that city to Marion, Ohio. Limited production will be maintained at the new factory until local help is broken in, according to F. C. Cory, general manager.

Names in the News

D. F. CLASH, formerly associated with the Research and Development Division of the Anaconda Wire and Cable Company, at Pawtucket, R. I., has joined the Acorn-Insulated Wire Company, Brooklyn, N. Y., as factory manager.

ROBERT S. WILSON, vice-president in charge of sales, Goodyear Tire and Rubber Company, Akron, received his 25-year service pin at a surprise dinner held at the Portage Country Club on September 8. He started with the company as a tire adjuster in 1912 and was named sales manager in 1928.

JOHN C. INK has been appointed head of the recently-formed automobile tire division of the General Tire and Rubber Company, Akron. He has been with General for the past thirteen years in various sales posts.

I. B. VAN HOUTEN, formerly advertising manager of Raybestos-Manhattan, Inc., Passaic, N. J., has been appointed to a similar post by Manning, Maxwell and Moore, Inc., Bridgeport, Conn., manufacturers of metal specialties.

GEORGE SEYBOLD, in charge of rubber plantations for the U. S. Rubber Company for a number of years, has joined the Firestone Plantations Company as vice-president and general manager, and has already sailed for Liberia to take over management of the Firestone plantations in that country.

B. T. BUSH, who recently resigned as manager of the aromatics division of Naugatuck Chemical, has joined Albert Verley, Inc., Chicago, makers of synthetic perfume raw materials, as vice-president in charge of production.

T. F. DUNN, managing director of Witco, Ltd., English affiliate of Wishnick-Tumpeer, Inc., has returned to England after spending several weeks in this country. He reported that business was good in England and on the Continent.

ALBERT A. WOLL, a recent graduate from the Massachusetts Institute of Technology, has joined the technical staff of Wishnick-Tumpeer, Inc.

HARVEY S. FIRESTONE, JR., vice-president, Firestone Tire and Rubber Company, Akron, accompanied by a group of eight other Firestone executives, sailed for Liberia on the *S.S. Roma* on October 2 for the annual inspection of the company's plantations.

C. W. SEIBERLING, vice-president, Seiberling Rubber Company, Akron, has accepted the chairmanship of the "Know Akron" campaign which will be staged later this year by the Akron Chamber of Commerce.

Davol Elects New Officers

The following officers of the Davol Rubber Company, Providence, R. I., were elected at a recent meeting of the board of directors: Ernest I. Kilcup, chairman of the board, president and treasurer; Walter L. Davol, vice-president and secretary; Edward Osborne, assistant treasurer; Ralph D. Berry, assistant secretary. The positions assumed by Mr. Kilcup, who previously was managing director of the company, are those left vacant since the death of Chas. J. Davol earlier this year. In addition to his new duties, Mr. Osborne continues as office manager, while Mr. Berry continues as purchasing agent. All four of the new officers have been with Davol for a number of years.

GEORGE STRITCH, manager of the Detroit manufacturers' sales division of the B. F. Goodrich Company, Akron, has completed twenty years of service with that company and received his service pin. He has represented Goodrich in the Detroit area for the past seventeen years.

B. J. LEMON, tire engineer, U. S. Rubber Products, Inc., Detroit, Mich., has been nominated a vice-president of the Society of Automotive Engineers. Nomination in the S.A.E. is tantamount to election.

G. C. MAASSEN, associated with the Dryden Rubber Company for the past two years, has joined the sales staff of the rubber division of the R. T. Vanderbilt Company, New York City. Prior to his connection with Dryden, he served with the Goodrich and Hewitt Rubber companies, specializing in compounding and processing.

CHARLES B. RAYMOND, formerly a vice-president and currently a director of the B. F. Goodrich Company, is critically ill from pneumonia at the Cottage Hospital, Santa Barbara, California.

F. A. SEIBERLING, president, Seiberling Rubber Company, Akron, reached his 78th birthday on October 6. He announced his retirement from active business participation by the end of the current year.

J. R. DUNLAP, president of the Dunlap Rubber Co., Akron, was elected president of the Beta Theta Pi local alumni group at a meeting held in Akron on September 20.

S. T. CAMPBELL, who resigned as president of the Aetna Rubber Company, Cleveland, several months ago, has also resigned from the directorate of that company.

SEVERAL FACTORIES PLANNED IN CHINA

In order to secure preferential treatment from the Chinese government in Fukien, it is reported that four leading Chinese rubber manufacturers, now operating factories in Selangor, Federated Malay States, are making joint preparations to establish factories in Amoy, the chief city of the Fukien province. These four manufacturers are the Nanyang Rubber Goods Manufacturing Co., the Hua Chiau Co., the Sing Chew Co., and the Shen Yip Liong Rubber Manufactory.

Since there is no tax on goods manufactured in China, the products of rubber factories located within the territory can generally be sold at prices far below those sent into the country by foreign manufacturers. Several other manufacturers located in British Malaya are understood to have opened or plan to open branches in Canton, Hongkong and Shanghai, especially for the manufacture of rubber footwear and household articles. Rubber footwear is expected to replace the old-fashioned, hand-made leather-soled shoes which have been used by the Chinese for centuries.

China is slowly assuming an important position as a rubber manufacturing country. In 1927 China imported only 141 tons of crude rubber. These imports increased to 8,034 tons for 1936. Another increase is expected in the current year, since imports during the first three months alone totalled 3,290 tons.

Form Synthetic Rubber Co.

In connection with reported plans for experimental work in the manufacture of synthetic rubber in Italy, the Government has announced the formation of the Institute per lo Studio della Gomma Sintetica (Research Institute for Synthetic Rubber), capitalized at 2 million lire, and the Societa Italiana per la Produzione della Gomma Sintetica (Italian Society for the Production of Synthetic Rubber), capitalized at 1 million lire. Dr. Alberto Pirelli and Prof. Francesco Giordani will head both the research institute and the producing company.

A. B. COWDERY, technical representative of rubber compounding materials for the Barrett Company, New York City, is convalescing in St. Luke's Hospital, New Bedford, Mass., following an accident last month in which he sustained severe injuries.

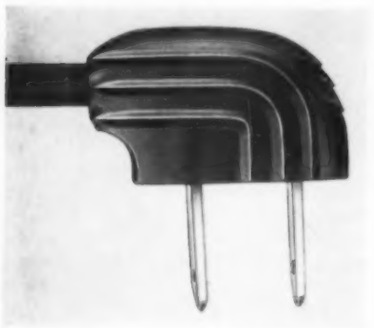
ARTHUR HUDSON MARKS has been elected vice-chairman of the board of directors of the B. F. Goodrich Company, Akron. He has been a director and member of the executive committee of the company for many years. At one time he was vice-president and general manager of the Diamond Rubber Co., taken over by Goodrich in 1912.

ADVERTISING PAGES REMOVED

New Rubber Goods

G-E Rubber Angle Plug

A new type of molded rubber angle plug, that is molded in one piece with the cord and designed for use with



lamps, clocks and small electrical appliances, has been announced by the General Electric Company, Bridgeport, Conn. The rubber plug is molded at right angles on the cord. This feature allows the cord to lie close and flat against the wall or baseboard when the plug is inserted in outlets. Molding of the plug and cord together in one piece also makes possible attractive design.

Goodrich Lacquer Hose

A new hose designed especially for spraying various types of lacquer and synthetic enamels has been announced by the B. F. Goodrich Company, Akron. The tube of this hose is made of

Thiokol, which has a high resistance to the powerful solvents found in lacquers. The hose is of braided construction and has a smooth, flexible cover of black rubber. It is available in 500-foot lengths in ¼, ⅜ and ½-inch sizes.

Splashgon Eliminating Device

Water streams from filter pumps, which splash far more than those from ordinary faucets because the pump pulls in and entrains a considerable amount of air, can now be controlled by means of the Splashgon, a development of the Fisher Scientific Company, Pittsburgh, Penna. This device separates the air from the water and slackens the speed of flow to one-fourteenth of its original speed, also reducing by one-half the sound of a filter pump in action. The Splashgon is made of a rubber exterior in the shape of a cylinder with a neck at the top which fits over the filter pump. It is 2⅜ inches long and 1¼ inches wide at the bottom. A brass device on the interior spreads the water stream so

that it flows with equal force through a wire mesh at the bottom of the Splashgon.

Faucet-Queen Sink Spray

A rubber adapter for faucet use, which provides either a spray or a stream and which combines filter and anti-splash characteristics, has been

developed by the Faucetqueen Company, 205 West Wacker Drive, Chicago, Ill. Known as the Faucet-Queen, this adapter features a small lever which controls the water flow so that if a round and solid stream is

desired it may be attained without removing the adapter from the faucet. The spray member has a 2¼-inch diameter.

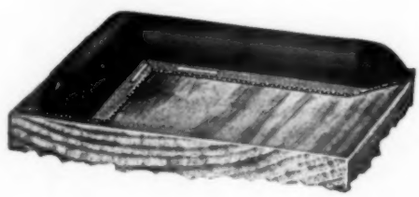
Dockson Welding Helmet

A new turret-type welding helmet has been developed by the C. H. Dockson Company, 2885 East Grand Boule-

vard, Detroit, Michigan, in which the customary riveted construction of the face piece has been replaced by fibre sheet formed in a single piece and the metal in the lens holder replaced by oil-resistant rubber. The holder contains a clear cover plate, easily replaced when necessary, which protects the costly filter lens located behind it. The rubber acts as a shock absorber to protect the lens and cover plate if the shield should be dropped. Dockson has also introduced a handshield of this type which is equipped with a corrugated fibre handle for firm gripping.

Cold Storage Door Gasket

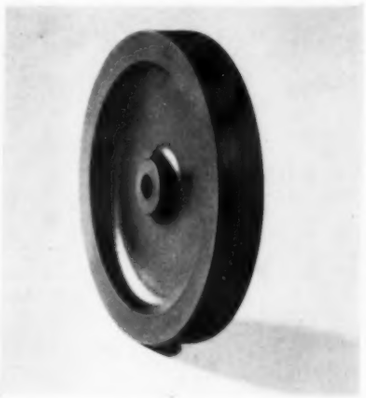
Based on the principle that confined air space in a cellular construction furnishes the best insulation, the Jamison Cold Storage Door Company, Hagerstown, Maryland, has developed a new cold storage door gasket made of cellular rubber. Being resilient, the



new gasket conforms to the door frame. It requires no "pinching up," and is said to maintain greater and quicker recovery after compression than other types of similar gaskets. The smooth, waterproof surface prevents water-logging. The new Jamison gasket is available in two forms, *i.e.*, Type CD (illustrated) for standard infitting doors, and Type SF for sharp freezer doors of the overlap type.

Vacuum Cleaner Wheel

Designed to replace pressed metal wheels with lathe-cut rubber tires cemented in place, used in connection



with vacuum cleaners, the B. F. Goodrich Company, Akron, has developed a molded rubber wheel which combines a hard rubber center with a soft rubber tread. This new all-rubber wheel, in which a bronze oilless bearing is cast to eliminate squeaks and necessity for oiling, is said to cost no more than the metal and rubber type, eliminates the assembly operation previously required, minimizes tire failures, and enables the manufacturer of vacuum cleaners to maintain a balanced stock. While originally designed for vacuum cleaner use, this all-rubber wheel is adaptable on any type of light equipment.

Sav-A-Leg Home Plate

Designed to enable baseball players to avoid catching their spikes on the edges of home plates, the Seamless Rubber Company, New Haven, Conn.,

has introduced the Sav-A-Leg home plate. This plate, which has a white rubber surface and a beveled apron of black rubber (which is covered with dirt when the plate is set in the ground), prevents sliding accidents because the spikes slide up and over the plate instead of being checked abruptly against the edge. The new plate was invented by John O. Seys, vice-president of the Chicago Cubs.

Syra-Bord Rubber Tile

Said to be the only tongued and grooved rubber flooring tile manufactured, the Servicised Products Corporation, Chicago, is featuring Syra-Bord interlocked rubber tile. Syra-Bord, according to its manufacturer, is a floor in itself, not merely a floor covering. It is molded in 10-foot lengths, the individual blocks being held together by a flexible stock which acts as an expansion joint between each block. It is made with a tongue and a groove on the sides and ends so that the blocks form a perfect pattern. Available in several color combinations, Syra-Bord is available in either 3/16th or ¼ inch thicknesses. Although it may be laid without cement, the manufacturer recommends the use of cement for sanitary reasons.

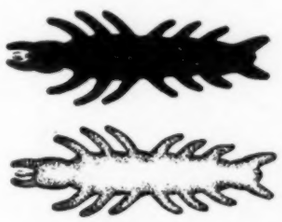
Impact Belt Carrier

Longer life under consistently heavy impact is claimed for the Impact Belt Carrier produced by the Stephens - Adamson Mfg. Company, Aurora, Illinois. The additional life space is attained by the use of a 1⅞-inch vulcanized rubber covering which extends around the 2¼-inch hub, giving a roller of standard 6-inch diameter. The rubber is wound about the pressed steel hub in layers, the first layer being vulcanized to the

steel hub and additional layers added to give the 1⅞-inch solid rubber cushion. The impact carrier is built in two styles, for normal and for heavy duty. It is tilted to train belt without guide rollers and has three 6-inch rollers with the outer rollers tilted to give a 20° trough. It can also be furnished for flat belts.

Sponge Rubber Fishing Lure

Made of sponge rubber, a new fishing lure for bass has been introduced by the Fur Fame Bait Company, Fremont, Ohio. Resembling the hellgramite (a water insect) in appearance, this new lure is threaded on the hook like the genuine bait, and because of its shape and construction gives lifelike action in the water. The



new bass lure, called the Bass Begger, is furnished with hook attached. The hooks can be easily replaced if bent, broken, or if different sizes are desired.

Effanbee Novelty Dolls

Fleischaker & Baum, 45 Greene Street, New York City, makers of the famous Effanbee dolls, have added two

new novelty dolls to their line. Termed the "Ha-Ha" and "Boo-Hoo" models, these dolls are made entirely of rubber, the former being decorated in bright red and having a jovial expression, while the latter is decorated in blue and has a lugubrious expression. The dolls are packed in individual, cellophane window boxes, and retail at $1.00 each.

Health-E-Mouth Tooth Brush

A tooth brush featuring sponge rubber instead of the customary bristles, called Health-E-Mouth, has been introduced by the Bufa Laboratories, Inc., 647 West Virginia Street, Milwaukee, Wisconsin. A piece of

rubber tubing is inserted in the center of the sponge rubber brush, this construction permitting it to adhere firmly to the unbreakable handle, and also providing for easy refill replacement. Use of this sponge rubber tooth brush is said to eliminate bleeding gums.

Bond Latex-Sealed Tubes

A new latex closure that permits collapsible metal tubes to be hermetically sealed is a recent development of the Bond-Penn Tube Company, Wilmington, Delaware. During the tube manufacturing operation a band of latex is placed around the inside bottom of the tube and when the tube is crimped and clipped the latex serves as a bonding agent to more firmly adhere both inner surfaces of the tube to each other. This bonding action prevents "breathing" of the contents of the tube. Use of the latex band requires no change in filling methods or in equipment. Glycerine and volatile solvents have been successfully put up in tubes using the latex band.

MARKETS

RUBBER—COTTON AND FABRICS—CHEMICALS

NEW YORK, OCTOBER 11, 1937

Crude Rubber

CONFLICTING war news from the Far East and its possible effects on shipments of crude rubber from Eastern shipping centers, combined with sustained lack of factory interest, plus a renewed wave of selling following the meeting of the International Rubber Regulation Committee, at which quotas were left undisturbed at 90%, all combined to force a steadily declining price for spot rubber on the Commodity Exchange since our last report. Starting with a price of 19.18 on September 10, spot rubber reached a new low for the current movement today (October 11), being quoted at 16.63. Considerable attention is being given in trade circles to the excess shipments of crude rubber from the Far Eastern producers, these shipments being far above permissible quotas. Most of the excess shipments came from the Netherlands East Indies and is explained by that government as being the result of accelerated issuance of native licenses by the Restriction Committee. Quotations in the outside market, Exchange, London and Singapore, follow:

As of October 11

Plantations—

Ribbed Smoked Sheets—			
No. 1 Spot	—	@	.16 11/16
January March	—	@	.16 11/16
April-June	—	@	.16 11/16
No. 2	—	@	.16 1/2
No. 3	—	@	.16 1/4
No. 4	—	@	.16
Thin Latex Crepe	—	@	.17 1/16
Thick Latex Crepe	—	@	.17 1/16
Brown Crepe, No. 1	—	@	.15 11/16
Brown Crepe, No. 2	—	@	.15 11/16
Amber Crepe, No. 2	—	@	.15 11/16
Amber Crepe, No. 3	—	@	.15 1/16
Amber Crepe, No. 4	—	@	.15 1/16
Brown Crepe, Rolled	—	@	.13 15/16

Latex—

Liquid Latex, per gal.	.62	@	.63

Paras—

Up-River, fine	—	@	.18 3/4
Acre Bolivian, fine	—	@	.19

Balata—

Block, Ciudad	—	@	.30

LONDON MARKET

Standard Smoked Sheets—Buyers—October 11

January-March	—	@	8 3/16d
April-June	—	@	8 1/16d

SINGAPORE MARKET

Standard Smoked Sheets—Sellers—October 11

January-March	—	@	7 15/16d
April-June	—	@	8d

Reclaimed Rubber

Reclaimers report a lull in demand from the activity of the past several months, although increased interest is expected in the early future. Introduction of new automobile models late next month is expected to contribute to this activity. Optimism is expressed in most quarters, although no immediate return to the demand witnessed earlier in the year is anticipated. Reclaimed consumption dropped somewhat last month in relation to crude rubber consumption. Current quotations follow:

Shoe

Unwashed, lb.	.07	@	.07 1/4
Washed, lb.	.10	@	.10 1/2

Tube

No. 1 (Floating), lb.	.19	@	.19 1/4
No. 2 (Compounded), lb.	.10 1/2	@	.11
Red tube, lb.	.10 1/2	@	.11

Tires

Black (acid process), lb.	.07 1/4	@	.07 1/2
Black, selected tires, lb.	.06 1/4	@	.06 1/2
Dark Gray, lb.	.10	@	.10 1/2
White, lb.	.15	@	.15 1/2
Truck, Heavy Gravity, lb.	.06 1/2	@	.07
Truck, Light Gravity, lb.	.08	@	.08 1/2

Miscellaneous

Mechanical blends, lb.	.04 1/2	@	.05

Scrap Rubber

(Delivered Akron Mills)

Dealers report that business is quiet with some demand from reclaimers. Prices have dropped slightly on several grades, including tire peelings, beadless tires and all three grades of tube stocks shown. The introduction of new automobile models in the Fall is expected to revive interest. Current quotations follow:

(Prices to Consumers)

Auto tire peelings, ton	23.00	@	24.00
Mixed auto, ton	14.00	@	14.50
Beadless tires, ton	17.75	@	18.50
Clean solid truck tires, ton	28.00	@	30.00
Boots and shoes, ton	21.00	@	23.00
Arctics, untrimmed, ton	17.00	@	19.00
Inner tubes, No. 1, lb.	.11	@	.12
Inner tubes, No. 2, lb.	.05 1/4	@	.05 3/4
Inner tubes, Red, lb.	.05 1/4	@	.05 3/4

Cotton

Under the influence of almost perfect weather for the maturity and harvest of a large cotton crop, prices have declined steadily since our last report. Ordinarily, a price decline similar to that occurring would serve to stimulate consumption, but the unsettled world political situation makes for considerable uncertainty in this regard. On October 8 the Secretary of Agriculture announced that the country's cotton exchanges would take speculative accounts in the commodity out of the credit class through the establishment of minimum margin requirements, effective January 1. The effect of this announcement was the breaking of the price from 8.33 to 8.05, a drop of 28 points. The price bounced back to 8.30 on the following trading today, however, stimulated by market purchases at the new low level. High for the period was 9.17 on September 11. The current market price is well below the loan level and there is a distinct trend toward loan cotton rather than market cotton. In terms of gold the current price is lower than it was in 1932, which means it is at an all-time low. Quotations for middling uplands on the Exchange follow:

	Sept. 9	October 11		
	Close	High	Low	Close
December	9.13	7.97	7.82	7.96
January	9.27	7.84	7.70	7.84
March	....	7.85	7.70	7.83

Tire Fabrics

(Prices Net at the Mill)

Peeler, carded, 23/5/3, lb.	.28 1/4	@	.28 1/2
Peeler, carded, 23/4/3, lb.	.29 1/4	@	.29 1/2
Peeler, carded, 15/3/3, lb.	.26 1/4	@	.26 1/2
Peeler, carded, 13/3/3, lb.	.25 1/4	@	.25 1/2
Egyptian, carded, 23/5/3, lb.	.42	@	.42 1/4
Egyptian, combed, 23/5/3, lb.	.44	@	.44 1/2
CHAFERS			
Carded, American, 1 1/16", lb.	.28 1/2	@	.29
Carded, American, 1", lb.	.24	@	.27

Sheetings

48x40	36 in.	5.50	lb.	@	.03 7/8
40x40	36 in.	6.15	lb.	@	.03 1/2
40x36	36 in.	6.50	lb.	@	.03 1/4
58x48	40 in.	2.50	lb.	@	.08 1/2
48x48	40 in.	2.85	lb.	@	.07 1/2
56x60	40 in.	3.60	lb.	@	.07 1/4
48x44	40 in.	3.75	lb.	@	.05 7/8
44x40	40 in.	4.25	lb.	@	.05 1/2

Ducks

Enameling (single filling), lb.	.25	@	.27 1/2
Belting and Hose, lb.	.26 1/4	@	—
Single filling, A grade, lb.	.11 1/2	@	.13 1/2
Double filling, lb.	.12 1/2	@	—

Closing Rubber Prices on New York Commodity Exchange, Inc.

No. 1 Standard Contract of 10 tons

FROM SEPTEMBER 10 TO OCTOBER 11

Date		Spot	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Sales
Sept.	10	19.18	19.16	19.23	19.27	19.31	19.35	19.39	19.44	19.47	19.50	19.53	19.56	19.59	——	202
	11	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
	12	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
	13	18.75	18.70	18.74	18.79	18.85	18.92	18.97	19.00	19.04	19.10	19.14	19.18	19.22	——	537
	14	18.68	18.66	18.73	18.77	18.81	18.86	18.90	18.94	18.98	19.02	19.06	19.11	19.15	——	235
	15	18.81	18.84	18.87	18.90	18.94	18.99	19.02	19.05	19.07	19.10	19.14	19.19	19.23	——	288
	16	18.56	18.57	18.60	18.66	18.72	18.78	18.80	18.82	18.88	18.92	18.97	19.02	19.06	——	269
	17	18.53	18.47	18.52	18.57	18.61	18.66	18.69	18.72	18.74	18.76	18.81	18.87	18.92	——	221
	18	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
	19	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
	20	18.35	18.30	18.35	18.39	18.44	18.50	18.53	18.57	18.60	18.64	18.67	18.70	18.74	——	219
	21	18.44	18.38	18.43	18.49	18.55	18.61	18.63	18.67	18.71	18.75	18.80	18.84	18.89	——	269
	22	18.44	18.37	18.42	18.49	18.55	18.61	18.63	18.66	18.70	18.74	18.78	18.83	18.87	——	230
	23	18.32	18.25	18.28	18.33	18.38	18.43	18.46	18.49	18.54	18.58	18.63	18.68	18.72	——	132
	24	18.25	18.20	18.17	18.21	18.26	18.30	18.34	18.38	18.43	18.48	18.52	18.57	18.61	——	642
	25	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
	26	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
	27	18.25	18.23	18.25	18.30	18.34	18.39	18.42	18.45	18.50	18.54	18.60	18.66	18.71	——	337
	28	18.03	——	17.92	17.97	18.03	18.08	18.13	18.18	18.20	18.23	18.26	18.30	18.34	——	509
	29	17.72	——	17.60	17.68	17.76	17.81	17.84	17.86	17.91	17.93	17.97	18.01	18.05	——	555
	30	17.56	——	17.41	17.49	17.57	17.59	17.64	17.69	17.71	17.73	17.79	17.85	17.90	——	344
Oct.	1	17.68	——	17.57	17.65	17.73	17.78	17.82	17.87	17.90	17.93	17.96	18.00	18.03	18.07	263
	2	17.75	——	17.58	17.66	17.73	17.78	17.81	17.83	17.87	17.91	17.95	18.00	18.03	18.07	71
	3	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
	4	17.63	——	17.50	17.57	17.65	17.70	17.73	17.76	17.79	17.83	17.87	17.92	17.96	18.00	143
	5	17.18	——	17.06	17.14	17.20	17.23	17.27	17.31	17.35	17.39	17.43	17.47	17.51	17.55	502
	6	17.00	——	16.90	16.97	17.05	17.09	17.12	17.16	17.19	17.22	17.25	17.29	17.34	17.40	758
	7	16.75	——	16.58	16.65	16.71	16.75	16.78	16.81	16.86	16.89	16.93	16.98	17.02	17.06	351
	8	16.68	——	16.62	16.69	16.75	16.79	16.83	16.88	16.92	16.96	16.98	17.03	17.07	17.11	185
	9	16.81	——	16.71	16.77	16.84	16.84	16.91	16.98	17.01	17.04	17.06	17.09	17.11	17.14	140
	10	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
	11	16.63	——	16.53	16.59	16.66	16.71	16.75	16.79	16.81	16.84	16.88	16.92	16.96	17.00	242

Rubber CHEMICAL Markets

NEW YORK, OCTOBER 13, 1937 [All Quotations F.O.B. Works Unless Otherwise Noted]

ACCELERATORS

Organic				
A-1 (Thiocarbanilid)	lb.	.26	@	—
A-5-10	lb.	.34	@	—
A-11	lb.	.57	@	—
A-19	lb.	.57	@	—
A-32	lb.	.72	@	—
A-77	lb.	.47	@	—
A-100	lb.	.47	@	—
A-433	lb.	.50	@	—
Aldehyde ammonia, crystals	lb.	.65	@	.70
Altax	lb.	—	@	—
Captax	lb.			
Crylene	lb.	.55	@	.65
paste	lb.	.45	@	.55
Di-Ortho-Tolyguanidine	lb.	.44	@	.47
Diphenylguanidine	lb.	.35	@	.37
El-Sixty	lb.	.57	@	—
Ethylidene aniline	lb.	.45	@	.47½
Formaldenyde aniline	lb.	.37½	@	.42
Guantal	lb.	.45	@	—
Heptene	lb.	.40	@	—
Hexamethylenetetramine	lb.	.36	@	—
Lead Oleate, No. 999	lb.	.12	@	—
Witco	lb.	.12	@	—
Lithex	lb.	.18	@	.20
Methylenedianiline	lb.	.36	@	.37
Monex	lb.	3.25	@	—
Oxynone	lb.	.68	@	—
Phenex	lb.	.50	@	.55
Pip-Pip	lb.	2.50	@	—
Pipsolene	lb.	1.75	@	—
R & H 40	lb.	.40	@	.41
R & H 50	lb.	.40	@	.41
R-2	lb.	1.65	@	—
R-23	lb.	.57	@	—
Safex	lb.	1.20	@	1.25
SPDX	lb.	.75	@	—
Super-Sulphur No. 1	lb.			
No. 2	lb.			
Thiocarbanilid, drums	lb.	.26	@	—
Trimene	lb.	.75	@	—
base	lb.	1.20	@	—
Triphenylguanidine	lb.	.58	@	.60
Tuads	lb.			
Ureka	lb.	.65	@	—
Ureka Blend B	lb.	.65	@	—
Ureka C	lb.	.60	@	—
Vulcanex	lb.			
Vulcone	lb.			
Vulcanol	lb.			
Z-88-P	lb.	.51	@	—
Zimate	lb.			
Inorganic				
Litharge, domestic	lb.	.07½	@	.08½
Magnesia, calcined, heavy	lb.	.04	@	—

COLORS

Blacks (See Compounding Materials)

Blues				
Prussian	lb.	.36	@	.37
Ultramarine	lb.	.15	@	—
Browns				
Mapico	lb.	.13	@	—
Umber, Turkey	lb	.04	@	.04½
Greens				
Chrome	lb.	.21	@	—
Chromium Oxide, bbl.	lb.	.21	@	—
Guignet's Green	lb.	.70	@	—
Reds				
Antimony crimson, 15/17	lb.	.48	@	—
sulfur, free	lb.	.48	@	.60
Indian English	lb.	.09	@	.10
Domestic (Maroon)	lb.	.11	@	—
Red oxide, pure	lb.	.10	@	.12
Rub-Er-Red, f.o.b. Easton	lb.	.09¼	@	—
Whites				
Cryptone, No. 19	lb.	.05⅞	@	.06⅛
Cryptone CB, No. 21	lb.	.05⅞	@	.06⅛
Cryptone, ZS-20	lb.	.09	@	.09¼
Cryptone, ZS-86	lb.	.09	@	.09½
Lithopone				
Albalith, black label—11	lb.	.04⅜	@	.04⅝
Azolith	lb.	.04⅜	@	.04⅝
Rayox	lb.			
Titanox A	lb.	.16	@	.16¾
Titanox B	lb.	.05⅞	@	.06⅛
Titanox C	lb.	.05⅞	@	.06⅛
Zinc Oxide—American Process				
American Azo: ZZZ (lead free)	lb.	.06¼	@	.06½
Anaconda, lead free	lb.	.06¼	@	.06½
Horsehead Lead Free Brand:				
Special—3	lb.	.06¼	@	.06½
XX Red—4	lb.	.06¼	@	.06½
XX Red—72	lb.	.06¼	@	.06½
XX Red—78	lb.	.06¼	@	.06½
XX Red—103	lb.	.06½	@	.06¾
Kadox, black label—15	lb.	.06½	@	.06¾
Blue label—16	lb.	.06½	@	.06¾
Red label—17	lb.	.06½	@	.06¾
St. Joe, black label	lb.	.06¼	@	.06½
green label	lb.	.06¼	@	.06½
red label	lb.	.06¼	@	.06½
U. S. P.—7, bbls.	lb.	.09	@	.09¼
Zinc Oxide—French Process				
Florence White seal—7 bbls.	lb.	.08½	@	.08¾
Green seal—8	lb.	.08	@	.08¼
Red seal—9	lb.	.07½	@	.07¾
Yellows				
Cadmolith	lb.	.61	@	—
Chrome	lb.	.14½	@	.15½
Mapico	lb.	.09½	@	—

BLACKS

Arrow "Aerfloted" Specification	lb.	.0535	@	.0825
Bone, powdered	lb.	.05½	@	.12½
Carbon, compressed	lb.	.0535	@	.0825
uncompressed	lb.	.0535	@	.0825
"Certified," Cabot	lb.	.0535	@	.0825
Spherons	lb.	.0535	@	.0825
"Disperso"	lb.	.0535	@	.0825
Drop, bbls.	lb.	.05½	@	.14
"Excello," compressed	lb.	.0535	@	.0825
"Fumonex"	lb.	.03	@	.07
"Gastex"	lb.	.03	@	.07
Lampblack	lb.	.07	@	.12
"Micronex"	lb.	.0535	@	.0825
"Supreme"	lb.	.0535	@	.0825
Thermatomic—"P 33"	lb.	—	@	—
"Thermax"	lb.	—	@	—
United "Dixie" & "Kosmos"	lb.	.0535	@	.0825

COMPOUNDING MATERIALS

Aluminum Flake	ton.	21.85	@	24.50
Ammonia carbonate, lump	lb.	.10½	@	.12
Asbestine	ton	13.00	@	15.00
Barium carbonate (98-100%)	ton	56.50	@	62.50
Barium Dust	lb.	.05	@	.06
Barytes	ton	23.65	@	31.15
Basofor	lb.	.04½	@	—
Bentonite	lb.	.02	@	.03
Blanc fixe dry f.o.b. works	ton	60.00	@	65.00
Calcene	ton	37.50	@	45.00
Catalpo (fact.)	lb.	.02	@	—
Chalk, precipitated				
Suprex white, extra lt.	ton	45.40	@	60.00
heavy	ton	45.00	@	55.00
Clay, Kaolin, domestic	ton	7.50	@	15.00
Aerfloted, Suprex	ton	9.00	@	21.00
Congaree	ton	9.00	@	—
Crown (f.o.b. plant)	ton	9.00	@	—
Dixie	ton			
Dixie, Jr.	ton			
McNamee	ton			
Par	ton			
Tensulite		15.00	@	—
Witco	ton	8.50	@	9.00
Cotton Flock	lb.	.11	@	.15
Glues, extra white	lb.	.28	@	.30
medium white	lb.	.14	@	.19
Kalite No. 1	ton	30.00	@	55.00
Kalite No. 3	ton	40.00	@	65.00
"Lime Crest" Industrial Filler No. 100	lb.	—	@	—
Magnesium carbonate	lb.	.07	@	.09
Mica	ton	35.00	@	44.00
Pyrax A	ton	—	@	—
Rottenstone (powdered)	lb.	.02½	@	.05
Soapstone, powdered	ton	16.00	@	22.00
Starch, powdered	cwt.	2.90	@	4.10
Talc, domestic	ton	17.00	@	20.00
Whiting, commercial	ton	17.00	@	18.00
Columbia Filler	ton	9.00	@	14.00
English Cliffstone	ton	33.00	@	43.00
Witco	ton	7.00	@	—
Wood Flour	ton	20.00	@	25.00
Zinc Carbonate	lb.	—	@	.11½
Zinc Stearate	lb.	—	@	.27

MINERAL RUBBER

Black Diamond	ton	27.00	@	—
Genasco, solid (factory)	ton	25.00	@	27.00
Hard Hydrocarbon	ton			
Parmr, solid	ton	25.00	@	—
Pioneer, MR, solid	ton			
Pioneer-granulated	ton			

MISCELLANEOUS

Aromatics—Rodo	lb.			
Curodex 19	lb.	2.75	@	—
Curodex 188	lb.	3.50	@	—
Curodex 198	lb.	4.50	@	—
Para-Dora No. 5145	lb.	2.00	@	—
Aresklene No. 375 (dispersing, wetting and penetrating agent)	lb.	.40	@	—
Santomerse (dispensing, wetting, penetrating and stabilizing agent)	lb.	.13	@	—
Sunproof	lb.	.55	@	.57½
Sponge Paste	lb.	—	@	.80
Tackol (tackifier)	lb.	.115	@	—
Tonox	lb	.56	@	.60

SOFTENERS

Acids				
Acetic, 28%, bbls.	100 lb.	2.53	@	2.78
Nitric, 36 degrees	cwt.	5.00	@	6.00
Sulfuric, 66 degrees	ton	15.50	@	16.50
Acids, Fatty				
Laurex	lb.	.15	@	.16
Stearex Beads	lb.	.10¾	@	.11¾
Stearic, double pressed	lb.	.12½	@	.13½
Stearite	lb.	.10½	@	.11¾
Alkalies				
Caustic Soda, 76%	cwt.	3.05	@	4.25
Soda Ash, 58%, C.L.	cwt.	1.25	@	3.05
Oils				
Cycline Oil	gal.	.20	@	—
Degras, bbls.	lb.	.07¾	@	.08
Fluxrite	lb.	.05½	@	.06½
Palm Niger	lb.	.05½	@	.06½
Para-Flux	gal.	.17	@	—
Petrolatum, light	lb.	.03⅛	@	.03⅜
Pigmentaroil, tank cars	gal.	.16	@	—
in drums	gal.	.22½	@	.23½
Pine, steam distilled	gal.	.64	@	.69
dest. dist., drums	gal.	.49	@	.50
Rosin Oil, cmpd	gal.	.40	@	—
Rubberol, f.o.b. Chicago	lb.	.13½	@	.14
Rubtack	lb.	.08	@	.10
Seedine, c.l.	lb.	.07¾	@	—
Tackol	lb.	.08½	@	.18
Witco Palm Oil	lb.	.07	@	—
Witco Softener No. 20	gal.	.20	@	—
Woburn No. 8, c.l.	lb.	.06	@	—
Wobonite, c.l.	lb.	.05	@	—
Resins and Pitches				
Pitch, Burgundy	lb.	.05½	@	.06½
coal tar	ton	19.00	@	22.00
hardwood	ton	16.00	@	22.50
pine, 200 lb. gr. wt.	bbl.	6.00	@	6.50
Pigmentar, tank cars	gal.	.16	@	—
in drums	gal.	.22½	@	.23½
R. S. L. Resin	lb.	—	@	—
Retort Pine Tar, drums	ton	20.00	@	26.00
Solvents				
Acetone, pure	lb.	.06	@	.06½
Alcohol, denatured, methanol, No. 1 bbls.	gal.	.33	@	.39
Benzene, 90%	gal.	.18	@	.23
Beta-Trichlorethane	gal.	—	@	.20
Bondogen	lb.	—	@	—
Carbon, bisulfide	lb.	.05¼	@	.08
Carbon tetrachloride	lb.	.05¾	@	.08¼
Dichlorethylene	lb.	—	@	.25
Dipentene, cml., drums	gal.	.41	@	.50
Dryolene (f.o.b. Okla.)	gal.	.10	@	.10½
Ethylene dichloride	lb.	.05½	@	.06½
Plastogen	lb.			
Reogen	lb.			
Rub-Sol (f.o.b. Okla.)	gal.	.09	@	
Trichlorethylene	lb.	—	@	.09½
Turpentine, spirits	gal.	.43	@	.47
dest. dist., drums	gal.	.33	@	.41
Waxes				
Beeswax, white	lb.	.39	@	.45
Carnauba, yellow	lb.	.46	@	.47½
Ceresin, white, dom.	lb.	.08	@	.11
Montan, crude	lb.	.10¾	@	.11¾
Paraffin (c.l.—f.o.b. N. Y.)				
Yellow crude scale	lb.	.02¾	@	—
White crude scale 124/126	lb.	.02¾	@	.03
Refined, 122/127	lb.	.04½	@	—

ANTI-OXIDANTS

AgeRite, Gel	lb.			
HP	lb.			
Powder	lb.			
Resin	lb.			
White	lb.			
Albasan	lb.	.70	@	.75
Antox	lb.			
B-L-E	lb.	.57	@	.60
Flectol H	lb.	.54	@	—
Flectol White	lb.	1.00	@	—
Flectol B	lb.	.54	@	—
Neozone	lb.			
Oxynone	lb.	.68	@	—
Perflectol	lb.	.67	@	.75
Retardex	lb.	.35	@	.40
Santoflex A	lb.	—	@	—
Santoflex B	lb.	.54	@	—
Staolite	lb.	.57	@	.62
Stabilite Alba	lb.	.70	@	.75
VGB	lb.	.55	@	.60

MOLD LUBRICANTS

Aresklene	lb.	—	@	—
Cocoa Soapstock	lb.	.06	@	.08
Dipex	lb.	.06	@	.08
Lubrex	lb.	.25	@	.30
Mold Paste	lb.	.18	@	—
Rubberol, f.o.b. Chicago	lb.	.13½	@	.14
Rusco, f.o.b. Nitro	lb.	.25	@	.30
Sericite, f.o.b. N. Y.	ton	65.00	@	—
Soap Tree Bark, cut, sifted	lb.	.06	@	.08

FACTICE OR RUBBER SUBSTITUTES

Amberex	lb.	.23	@	—
Black	lb.	.08½	@	—
White	lb.	.095	@	.15
Brown	lb.	.095	@	.14
Neophax	lb.	.13	@	—

VULCANIZING INGREDIENTS

Sulfur Chloride, yellow (drs.)	lb.	.04½	@	—
Sulfur flour.				
Refined, 100% pure (bags)	cwt.	2.55	@	3.65
Commercial (bags)	cwt.	1.60	@	2.35
Telloy	lb.			
Vandex	lb.			

Crude Rubber
Latex and Guayule
Reclaimed Rubber
Tires and Tubes

STATISTICS OF THE INDUSTRY

Rim Production
Automobiles
Gasoline
Cotton Prices

U. S. Imports and Exports of Crude Rubber

YEARS	Gross Imports: Long Tons	Total Declared Value	Average Declared Value per pound Cents	Re-exports: Long Tons	Total Declared Value	Average Declared Value per pound Cents	Net Imports: Long Tons
1922	301,076	101,843,188	15.10	4,809	1,921,828	17.84	296,267
1923	309,362	185,060,304	26.71	8,772	5,672,319	28.87	300,590
1924	325,899	173,367,272	23.75	10,309	6,057,637	26.23	315,590
1925	393,370	426,167,504	48.36	14,827	19,847,753	59.76	378,543
1926	409,944	501,131,064	54.57	17,671	22,470,583	56.77	392,273
1927	424,733	338,688,492	35.60	27,775	24,735,488	39.76	396,958
1928	432,633	242,727,423	25.05	32,159	18,128,761	25.17	400,474
1929	560,082	239,177,811	19.06	36,485	16,868,718	20.64	523,597
1930	482,083	139,133,048	12.88	30,205	9,310,205	13.76	451,878
1931	497,176	72,922,845	6.55	25,595	4,255,572	7.42	471,581
1932	409,556	31,936,459	3.48	20,930	2,015,612	4.30	388,626
1933	407,817	44,034,064	4.82	20,537	2,601,352	5.65	387,280
1934	449,313	97,929,676	9.73	23,848	5,770,109	10.80	425,665
1935	453,134	115,299,448	11.36	11,389	3,084,331	12.09	441,745
1936	467,064	152,072,496	14.54	12,581	4,488,223	15.93	454,483
1936:							
Jan.*	32,310	8,637,997	11.94	733	229,129	13.98	31,577
Feb.	32,879	9,293,711	12.62	625	199,956	14.27	32,254
Mar.*	33,447	9,845,776	13.14	1,172	390,551	14.88	32,275
Apr.*	44,218	13,967,712	14.10	984	343,785	15.59	43,234
May*	35,578	11,460,157	14.38	1,589	580,021	16.30	33,989
June	36,376	12,073,632	14.82	2,469	904,669	16.35	33,907
July	38,178	12,763,200	14.92	1,383	510,075	16.47	36,795
Aug.	40,027	13,364,916	14.91	840	307,114	16.32	39,187
Sept.*	48,368	16,691,919	15.41	656	244,554	16.64	47,712
Oct.	39,573	13,627,465	15.37	778	268,645	15.42	38,795
Nov.*	36,798	12,790,305	15.52	675	241,982	15.99	36,123
Dec.	49,312	17,555,705	15.89	677	267,745	17.65	48,635
1937:							
Jan.	42,002	15,408,242	16.38	844	372,053	19.69	41,158
Feb.	42,743	16,470,867	17.20	523	236,853	20.21	42,220
Mar.	38,682	16,030,267	18.50	1,146	522,931	20.37	37,536
Apr.	41,275	17,859,223	19.31	1,050	415,484	17.66	40,225
May	46,902	22,163,440	21.10	528	270,499	21.08	46,374
June	47,073	22,559,545	21.39	807	390,542	21.60	46,266
July	41,493	19,010,273	20.45	767	300,301	17.48	40,726
Aug.	48,020	20,595,314	19.15	670	265,298	17.69	47,350

* Revised.

Note: Annual figures for 1922-1936 revised on basis of information received on February 8, 1937. Figures for 1922 and 1923 include latex; guayule is included only in 1922.

United States Imports of Guayule, Balata, Jelutong, Liquid Latex

(All Quantities in Long Tons)

	Guayule Tons	Guayule Dollars	Balata Tons	Balata Dollars	Jelutong Tons	Jelutong Dollars	Liquid Latex (1) Tons	Liquid Latex (1) Dollars
1924	1,356	536,392	464	568,456	6,165	1,237,100	2,157	864,059
1925	3,781	1,803,448	517	574,750	6,749	1,642,531	3,272	3,537,510
1926	4,305	2,562,096	354	327,213	7,263	3,127,757	3,394	4,686,743
1927	5,018	2,674,957	582	477,246	7,785	2,448,657	1,495	1,170,650
1928	3,077	1,755,685	731	430,855	7,552	2,540,059	4,007	2,121,786
1929	1,275	545,175	728	566,964	8,204	2,458,126	3,729	1,788,391
1930	1,096	347,388	502	422,684	5,907	1,403,244	4,458	1,508,786
1931	....	.....	1,207	411,380	5,777	1,019,010	4,675	888,909
1932	....	.....	707	147,403	4,607	616,596	5,112	601,999
1933	....	.....	1,659	2,261,869	5,990	944,895	11,085	1,833,671
1934	398	75,349	1,054	438,209	4,987	943,752	13,107	3,643,221
1935	459	86,835	615	188,384	5,644	1,063,126	13,553	3,782,222
1936	1,229	286,552	535	199,368	6,163	1,296,364	19,852	6,659,899
1936:								
Aug.	146	37,147	72	23,715	321	64,769	1,761	602,992
Sept.	106	29,335	21	9,846	418	85,624	1,800	692,810
Oct.	114	31,489	11	4,815	452	102,485	1,392	500,817
Nov.	159	43,980	43	19,408	405	91,538	1,631	578,729
Dec.	134	36,972	14	7,247	538	109,208	2,070	735,156
1937:								
Jan.	160	44,166	10	4,348	247	56,056	1,337	535,546
Feb.	206	56,807	14	5,838	242	61,741	1,973	775,202
Mar.	136	37,453	29	13,949	898	187,413	2,216	968,053
Apr.	190	52,361	3	1,457	617	135,412	1,633	724,757
May	182	50,093	75	33,881	642	145,618	1,995	941,235
June	147	39,941	91	41,481	488	135,468	2,561	1,253,370
July	371	106,360	22	9,363	533	158,998	1,921	924,127
Aug.	335	95,893	16	5,876	363	107,611	1,801	838,778

(1) Weight given in pounds of dry rubber contained in latex.

Note: Annual figures for 1924-1936 revised on basis of information received on February 8, 1937.

U. S. Consumption of Crude Rubber

(Rubber Manufacturers' Association statistics raised to 100 per cent—All figures in long tons)

(All Quantities in Long Tons)

	1930	1931	1932	1933	1934	1935	1936*	1937
	Figures on Monthly Basis							
Jan.	36,194	28,557	29,648	22,645*	39,190*	46,636*	48,631	50,818*
Feb.	33,302	28,797	31,821	21,392*	40,515*	42,720*	36,841	51,887*
Mar.	35,540	32,788	29,505	17,483*	47,003*	42,153*	42,813	54,064*
Apr.	39,686	33,321	27,518	25,928	44,853*	44,247*	52,031	51,797
May	39,386	37,817	30,957	44,074	42,918*	41,101*	50,612	51,733
June	34,195	37,916	41,475	50,743*	40,147*	36,156*	52,772	51,798
July	29,508	31,397	29,976	49,614*	32,553*	35,917*	48,250	43,650
Aug.	30,850	27,586	23,721	44,428*	33,216*	38,775*	46,777	41,456
Sept.	25,515	23,638	23,847	35,281*	30,258*	37,086*	46,449	.....
Oct.	27,516	22,277	22,286	31,543*	31,253*	41,969*	49,637	.....
Nov.	23,691	22,943	23,231	28,831*	34,748*	42,310*	50,433	.....
Dec.	21,687	21,409	18,015	28,757*	36,569*	42,474*	49,754	.....
Tot.	375,980	348,986	332,000	400,719*	453,223*	491,544*	575,000	.....

* Revised.

Note: Figures for 1936 were revised on May 15, 1937, and are now based on Department of Commerce survey figures.

Reclaimed Rubber in the United States

(All Quantities in Long Tons)

Year	Production	Consumption Tons	Consumption % to Crude	Stocks[a]
1927	189,144	178,471	47.6	24,980
1928	208,516	223,000	50.4	24,785
1929	218,954	226,588	48.4	27,464
1930	157,967	153,497	40.8	22,000
1931	133,351	124,126	33.9	19,257

Year	Production	Consumption Tons	Consumption % to Crude	Stocks[a]
1932	75,608	77,504	23.4	16,354
1933	99,560	81,602	19.9	20,746
1934	110,010	100,597	22.2	23,079
1935	122,948	113,078*	23.0*	25,069
1936	150,571	141,486*	24.6*	19,000*

	Figures on Monthly Basis								
1936*:									
Jan.	11,665	10,922	22.5	17,171	July	12,330	12,856	26.6	16,202
Feb.	10,188	8,014	21.8	18,890	Aug.	12,856	11,959	25.6	16,487
Mar.	10,712	9,539	22.3	19,472	Sept.	12,959	12,153	26.2	16,711
Apr.	11,382	11,241	21.6	19,024	Oct.	14,737	13,715	27.6	17,141
May	11,512	11,311	22.3	18,590	Nov.	14,357	13,087	25.9	17,900
June	11,935	12,563	23.8	17,366	Dec.	15,938	14,126	28.4	19,000
1937:									
Jan.*	15,129	14,450	28.4	18,822	July	17,885	11,924	27.3	16,646
Feb.*	15,192	14,578	28.1	18,490	Aug.	15,289	14,670	35.4	18,299
Mar.*	14,462	15,601	28.9	16,450	Sept.	.....	.....	...	.....
Apr.	13,884	15,607	30.1	14,046	Oct.	.....	.....	...	.....
May	15,793	14,693	28.4	14,647	Nov.	.....	.....	...	...
June	16,052	14,414	27.8	14,535	Dec.	.....	.....	...	.....

[a] Stocks on hand at the end of month or year.

* Revised.

Note: Figures for 1936 were revised on June 1, 1937, and are now based on Department of Commerce survey figures.

U. S. Consumption of Gasoline

(Bureau of Mines Statistics)

(In Thousands of Barrels of 42 Gallons)

	1935	1936	1937		1935	1936	1937
January	28,147*	32,412*	33,696	August	43,097*	46,081	49,597
February	26,580*	27,216*	32,000	September	37,976*	44,346	.....
March	32,272*	35,871	40,561	October	41,566*	44,253	.....
April	36,363*	38,825	43,409	November	35,991*	39,919	.....
May	39,381*	42,007	45,484	December	33,872*	39,393	.....
June	38,086*	44,630	48,580				
July	41,479*	46,638*	50,929	Total	434,810*	481,591	.....

* Revised.

Rims Inspected and Passed in U. S.

(Tire and Rim Association Reports)

	Total		Total		Total
1925	26,001,664	1929	24,141,502	1933	8,713,962
1926	24,199,524	1930	17,364,096	1934	12,255,118
1927	19,700,003	1931	11,253,800	1935	18,664,356
1928	24,247,282	1932	6,261,336	1936	20,790,098
1937:		1937:		1937:	
January ...	2,123,723	May	2,189,502	September .	1,470,472
February ..	2,022,258	June	2,141,810	October ...	.....
March	2,166,218	July	1,702,105	November ..	.....
April	2,269,680	August	1,342,945	December ..	.....

Daily Spot Closing Prices of Ribbed Smoked Sheet Rubber—*New York Market, in Cents per Pound*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Ave.
1935																																
June	12⅞	—	12⅞	12⅝	12⅝	12½	12⅞	12⅝	—	13⅝	12⅝	12⅝	12¾	12⅝	12⅝	14⅜	12⅞	13⅛	—	—	14⅜	14½	—	12⅝	12⅝	12⅝	12⅝	12⅞	—	—	—	12⅞
July	—	12⅞	12¾	—	—	—	11⅞	12⅝	12⅝	12¾	12⅝	12⅝	—	12⅝	12⅝	12⅝	11⅞	12⅝	12⅛	12⅝	13⅛	12⅞	12⅝	12⅝	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	12⅛	12⅛
August	12⅞	12¾	11¾	11⅝	12¼	11⅞	11⅛	12⅛	12⅛	11⅝	11⅝	12⅛	11⅞	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11½	11½	12⅛	11½	12⅛	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	—	11½
September	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
October	11⅛	11¾	11⅞	12	12⅛	12⅛	12⅛	12¾	12¾	12⅝	12⅝	12⅝	13⅛	12¾	12¾	13⅜	13⅜	13⅜	13⅜	13⅛	13⅛	13⅛	13⅜	13⅛	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜
November	13¾	13⅝	12¾	12⅞	13	13⅛	13⅜	13⅜	13	13	13	13	13	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜
December	—	13⅞	—	12⅞	17⅛	—	—	—	—	12⅛	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1936																																
January	—	13½	13⅜	13⅜	—	13¾	13⅛	13⅛	13⅜	—	14⅛	14⅛	—	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅜	14½	14⅜	14⅜	—	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛
February	15⅛	—	15⅞	15⅞	15⅞	15⅞	15⅞	15⅛	—	15⅛	15⅛	15⅛	15⅛	15⅛	15⅜	15⅜	15⅛	15⅛	15⅛	15⅛	15⅜	—	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛
March	—	15⅝	15⅝	15⅝	—	15⅝	15⅝	—	15⅛	15⅛	—	—	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	—	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛
April	—	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛
May	—	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛
June	—	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛
July	—	16⅛	16⅛	16⅛	16¼	16⅛	16⅛	16⅛	16⅛	16¼	16¼	16¼	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Aug.	—	16⅛	16⅛	16⅛	16¼	16⅛	16⅛	16⅛	16¼	16¼	16¼	16¼	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Sept.	—	16⅛	16⅛	16⅛	16¼	16⅛	16⅛	16⅛	16¼	16¼	16¼	16¼	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Oct.	—	16⅛	16⅛	16⅛	16¼	16⅛	16⅛	16⅛	16¼	16¼	16¼	16¼	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Nov.	—	16⅛	16⅛	16⅛	16¼	16⅛	16⅛	16⅛	16¼	16¼	16¼	16¼	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Dec.	—	16⅛	16⅛	16⅛	16¼	16⅛	16⅛	16⅛	16¼	16¼	16¼	16¼	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
1937																																
Jan.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Feb.	—	21	—	20⅝	20⅝	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛
Mar.	—	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛
April	—	21⅛	21⅛	21⅛	22⅛	22⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛	24⅛
May	—	26⅛	26⅛	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝	25⅝
June	—	26⅛	26⅛	26⅛	26⅛	26⅛	26⅛	26⅛	26⅛	26⅛	26⅛	26⅛	26⅛	26⅛	26⅛	26⅛	26⅛	26⅛	26⅛	26⅛	26⅛	26⅛	26⅛	26⅛	26⅛	26⅛	26⅛	26⅛	26⅛	26⅛	26⅛	26⅛
July	—	20⅛	20⅛	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞	19⅞
Aug.	—	19⅛	19⅛	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞
Sept.	—	18⅛	18⅛	18¼	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝
Oct.	—	17¾	17¾	17⅝	17⅝	17⅝	16¾	16¾	16¾	16¾	16¾	16¾	16¾	16¾	16¾	16¾	16¾	16¾	16¾	16¾	16¾	16¾	16¾	16¾	16¾	16¾	16¾	16¾	16¾	16¾	16¾	16¾

Average Spot Closing Prices—Ribbed Smoked Sheets

(New York Market)

Average Price per Pound for Years 1910-1929

Year	Cents	Year	Cents	Year	Cents	Year	Cents	Year	Cents
1910	206.60	1914	65.33	1918	60.15	1922	17.50	1926	48.50
1911	141.30	1915	65.85	1919	48.70	1923	29.45	1927	37.72
1912	121.60	1916	72.50	1920	36.30	1924	26.20	1928	22.48
1913	82.04	1917	72.23	1921	16.36	1925	72.46	1929	20.55

Average Monthly Price per Pound Since 1930

	1930 Cents	1931 Cents	1932 Cents	1933 Cents	1934 Cents	1935 Cents	1936 Cents	1937 Cents
Jan.	15.24	8.34	4.38	3.08	9.32	13.10	14.35	21.37
Feb.	15.85	7.70	4.03	2.95	10.45	12.92	15.48	21.33
Mar.	15.34	7.71	3.35	3.01	11.01	11.51	15.89	24.09
Apr.	14.93	6.43	3.02	3.56	12.10	11.55	15.98	23.44
May	14.24	6.49	3.09	4.95	13.26	12.05	15.62	21.14
June	12.45	6.35	2.66	6.15	13.51	12.57	15.85	19.29
July	11.24	6.37	2.89	8.01	14.60	12.10	16.49	18.86
Aug.	9.96	5.38	3.63	7.31	15.47	11.98	16.25	18.37
Sept.	8.28	5.08	3.84	7.30	15.36	11.55	16.46	18.55
Oct.	8.20	4.87	3.65	7.64	13.96	12.62	16.55	
Nov.	9.01	4.65	3.44	8.66	13.04	13.15	17.97	
Dec.	9.05	4.64	3.24	8.87	12.98	13.28	20.01	
Average for Year	11.98	6.17	3.49	5.96	12.92	12.37	16.41	

London Closing Prices of Ribbed Smoked Sheets

(In Pence Per Pound)

Day	1937 July	1937 Aug.	1937 Sept.	1937 Oct.	Day	1937 July	1937 Aug.	1937 Sept.	1937 Oct.
1	9 5/8	—	8 7/8	8 9/16	17	—	8 11/16	9	—
2	9 9/16	—	8 11/16	8 5/8	18	—	8 11/16	—	—
3	—	8 3/4	8 11/16	—	19	9 9/16	8 11/16	—	—
4	—	8 7/8	—	8 9/16	20	9 1/2	8 11/16	8 7/8	—
5	9 9/16	8 11/16	—	8 9/16	21	8 7/8	—	8 11/16	—
6	9 1/2	9	8 11/16	7 15/16	22	8 7/8	—	8 7/8	—
7	9 5/8	—	9 9/16	8	23	8 3/4	8 3/4	8 7/8	—
8	9 9/16	—	9 5/8	8 1/16	24	—	8 7/8	8 3/4	—
9	9 9/16	9	9 3/4	8 1/16	25	—	8 7/8	—	—
10	—	8 7/8	9 5/8	—	26	8 11/16	8 7/8	—	—
11	—	8 11/16	—	8	27	8 11/16	8 7/8	8 11/16	—
12	9 5/8	8 11/16	—	—	28	8 11/16	—	8 3/4	—
13	9 5/8	8 11/16	9 5/8	—	29	8 3/4	—	8 1/2	—
14	9 7/8	—	9 5/8	—	30	8 3/4	8 7/8	8 3/8	—
15	9 3/4	—	9	—	31	—	8 7/8	—	—
16	9 7/8	8 11/16	8 11/16	—					

Average Monthly Price Per Pound

Month	1934 Pence	1935 Pence	1936 Pence	1937 Pence	Month	1934 Pence	1935 Pence	1936 Pence	1937 Pence
Jan.	4.429	6.434	6.758	10.378	Aug.	7.401	5.696	7.581	8.830
Feb.	4.920	6.292	7.255	10.503	Sept.	7.409	5.508	7.577	8.935
Mar.	5.136	5.745	7.450	11.766	Oct.	6.806	6.130	7.898	
Apr.	5.712	5.604	7.502	11.471	Nov.	6.294	6.308	8.572	
May	6.207	5.822	7.335	10.250	Dec.	6.295	6.340	9.580	
June	6.245	6.027	7.352	9.548	Average for Year	6.159	5.976	7.713	
July	7.053	5.801	7.696	9.136					

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market)

Recent Daily Price Per Pound

Date	1937 Aug.	1937 Sept.	1937 Oct.	Date	1937 Aug.	1937 Sept.	1937 Oct.	Date	1937 Aug.	1937 Sept.	1937 Oct.
1	—	9.29	8.55	11	10.75	9.17	8.33	22	—	8.89	
2	10.96	9.56	8.47	12	10.48	—		23	9.86	8.74	
3	11.04	9.36	—	13	10.70	9.01		24	9.85	8.53	
4	11.24	9.42	8.48	14	10.69	9.06		25	9.78	8.59	
5	11.35	—	8.45	15	—	9.21		26	9.73	—	
6	11.28	—	8.35	16	10.57	9.09		27	9.60	8.62	
7	11.24	9.46	8.33	17	10.56	9.05		28	9.70	8.66	
8	—	9.33	8.05	18	10.40	9.06		29	—	8.50	
9	10.82	9.37	8.30	19	10.17	—		30	9.52	8.46	
10	10.79	9.23	—	20	10.08	8.95		31	9.38	—	
				21	9.99	8.93					

Average Monthly Price Per Pound

	1934 Cents	1935 Cents	1936 Cents	1937 Cents		1934 Cents	1935 Cents	1936 Cents	1937 Cents
Jan.	11.25	12.70	11.91	13.06	Aug.	13.40	11.48	12.28	10.41
Feb.	12.28	12.58	11.53	13.15	Sept.	13.00	10.80	12.31	9.02
Mar.	12.30	11.63	11.43	14.46	Oct.	12.48	11.28	12.30	
Apr.	11.80	11.73	11.71	14.23	Nov.	12.53	12.01	12.23	
May	11.44	12.25	11.68	13.34	Dec.	12.76	11.99	12.83	
June	12.20	11.89	12.02	12.70	Average for Year	12.36	11.88	12.11	
July	12.84	12.26	13.11	12.26					

World Stocks of Crude Rubber

(All figures are in long tons)

ON HAND OR AFLOAT TO THE U. S.

At End of	ON HAND 1935	1936	1937	AFLOAT 1935	1936	1937	ON HAND AND AFLOAT 1935	1936	1937
Jan.	349,446	285,054*	201,915	42,066	43,870	55,096	391,512	328,924*	257,011
Feb.	340,264	282,902*	193,864	42,969	46,532	53,538	383,233	329,434*	247,402
Mar.	340,284	276,823*	191,928*	44,485	58,935	56,994	384,769	335,758*	248,922*
Apr.	337,586	277,478*	174,934	37,651	47,678	72,530	375,237	325,156*	247,464
May	322,558	262,415*	172,985	44,375	48,860	58,542	366,933	311,275*	231,527
June	324,218	245,544*	169,646	55,581	47,228	57,215	379,799	292,782*	226,861
July	334,692	235,850*	164,445	49,018	60,343	75,779	383,710	296,193*	240,224
Aug.	334,106	230,167*	171,052	47,724	63,597	80,439	381,830	293,764*	251,491
Sept.	331,121	228,477		43,413	62,240		374,534	290,717	
Oct.	322,857	219,553		49,913	67,825		371,770	287,378	
Nov.	308,993	212,515		46,588	73,691		355,581	286,206	
Dec.	303,000	218,844		39,094	56,567		342,094	275,411	

(Rubber Manufacturers' Association figures raised to 100%)

* Revised.

Note: Complete figures for 1934 and 1935 were revised by the R.M.A. on May 1, 1936.

STOCKS IN GREAT BRITAIN

(No. of Tons in Wharves and Warehouses, not including Latex)

At end of	London 1935	1936	1937	Liverpool 1935	1936	1937
January	81,807	84,791	29,005	66,405	77,188	41,895
February	87,605	79,757	26,508	67,983	77,138	37,078
March	92,664	74,779	21,292	69,218	72,823	30,622
April	94,361	68,932	21,128	70,584	71,388	27,443
May	95,722	61,349	21,351	71,927	69,150	25,081
June	98,077	55,993	21,964	73,131	66,173	21,258
July	99,226	49,575	22,589	74,915	63,715	19,424
August	101,574	45,749	25,211	75,584	62,367	19,817
September	101,198	44,364		76,263	59,485	
October	94,749	40,777		76,400	55,738	
November	90,542	37,495		76,301	51,184	
December	86,551	33,027		77,589	45,291	

(Figures from the Rubber Trade Association of London)

STOCKS IN OTHER CENTRES

(Figures from Statistical Bulletin of the Int'l Rubber Regulation Committee)

	Penang and Singapore [1]	Malaya [2]	Ceylon [3]	Holland	Para and Manaos
At end of 1936					
September	26,936	33,351	3,930	911	1,817
October	24,593	34,941	3,490	773	1,820
November	26,761	33,469	3,415	588	1,948
December	26,969	35,145	5,161	409	2,454
At end of 1937					
January	36,365	41,911	5,024	290	4,005
February	42,132	44,346	5,855	197	3,763
March	42,485	40,317	3,477	108	4,078
April	38,812	38,443	3,745	101	3,840
May	34,234	40,253	3,781	94	3,559*
June	45,085	48,545	4,558	98	1,019
July	44,776	43,270	3,725		1,050

[1] Dealers' and Port Stocks. [2] Inside Regulated Areas. [3] Dealers' Stocks Only.
* Revised.

RUBBER STOCKS AFLOAT

	Afloat for United States	Afloat for Europe	All Other * Afloat	Total * Afloat
End of: 1936:				
August	63,597	19,800	15,603	99,000
September	62,240	18,090	15,670	96,000
October	67,825	20,790	17,385	106,000
November	73,691	19,270	13,039	106,000
December	56,567	24,800	21,633	103,000
End of: 1937				
January	55,096	24,920	17,984	98,000
February	53,538	27,250	13,212	94,000
March	56,994	31,240	36,766	125,000
April	72,530	34,410	17,060	124,000
May	58,542	31,500	26,958	117,000
June	57,215	34,700	33,085	125,000
July	75,779	37,000	31,221	144,000
August	80,439	35,000p	24,561	140,000

* *Total Afloat* is an arbitrary estimate based on 1½ months' shipments as adopted by the Department of Commerce. *All Other Afloat* is determined by subtracting the amount of stocks in transit to the United States and Europe from the estimated total.
P—Preliminary estimate.

TOTAL WORLD STOCKS

(Figures from the Survey of Current Business)

At end of	1932	1933	1934	1935	1936*	1937
January	623,416*	634,797	661,948	698,153	600,479	454,249*
February	611,819*	626,227	663,308	686,195	599,355	445,265*
March	614,894*	638,428	666,382	678,809	583,318	447,856*
April	615,893*	629,159	658,796	677,006	567,172	428,249*
May	612,474*	626,537	689,239	677,569	541,871	413,134*
June	595,712	613,055	672,804	671,525	520,255	433,257*
July	589,037	618,258	676,200	679,061	519,074	445,782
August	597,274	617,449	674,702	680,644	500,520	457,462
September	599,986	623,683	694,361	661,509	493,585	.....
October	609,368	636,597	680,616	655,000	486,159	.....
November	614,342	642,968	684,408	617,300*	466,491	.....
December	629,898	654,890	705,975	613,987*	466,576	.....
Monthly Avge.	609,502*	630,171	677,395	666,397*	528,738	.....

* Revised.

U. S. Tire and Tube Statistics[1]

(All Figures Represent Thousands)

AUTOMOBILE CASINGS

Figures for Recent Years

	1929	1930	1931	1932	1933	1934	1935	1936
Production	68,726	50,965	48,740	40,085	45,303	47,233	49,362	58,116
Shipments	69,395	53,638	50,061	40,251	44,094	46,687	50,183	55,363
Inventory [2]	11,838	9,003	7,775	7,644	8,888	9,455	8,196	11,114

Figures for Recent Months

	PRODUCTION 1935	1936*	1937	SHIPMENTS 1935	1936*	1937	INVENTORY 1935	1936*	1937
Jan.	4,626	4,579	4,980	3,663	3,875	4,509	10,398	8,917	11,377
Feb.	4,383	3,579	5,246	3,287	3,212	4,371	11,530	9,265	12 308
Mar.	4,346	3,640	5,916	4,204	3,857	5,787	11,675	9,087	12.448
Apr.	4,512	4,857	5,730	5,144	4,904	5,560	11,003	9,035	12,629
May	4,175	4,974	5,352	4,067	5,833	5,375	11,131	8,178	12,592
June	3,910	5,612	5,339	4,262	5,793	5,389	10,755	7,835	12,529
July	3,532	5,466	4,292	5,447	5,744	5,190	8,850	7,750	11,654
Aug.	3,993	5,017		4,739	4,977		7,805	7,799	
Sept.	3,787	4,984		3,303	3,837		8,288	9,012	
Oct.	4,051	5,126		4,055	4,082		8,291	10,096	
Nov.	3,997	4,972		3,930	4,233		8,249	10,823	
Dec.	4,051	5,311		4,081	5,016		8,196	11,114	

AUTOMOBILE INNER TUBES

Figures for Recent Years

	1929	1930	1931	1932	1933	1934	1935	1936
Production	68,829	52,420	48,333	36,891	42,556	46,228	47,879	57,607
Shipments	70,592	54,938	50,021	37,911	41,391	45,046	48,067	54,626
Inventory [2]	12,807	9,999	7,922	6,749	7,815	9,180	8,231	10,985

Figures for Recent Months

	PRODUCTION 1935	1936	1937	SHIPMENTS 1935	1936	1937	INVENTORY 1935	1936	1937
Jan.	4,259	4,592	4,801	3,722	4,168	4,391	9,621	8,623	11,100
Feb.	4,171	3,556	5,091	3,362	3,446	4,536	10,466	8,699	11,734
Mar.	4,123	3,787	5,823	4,168	3,796	5,570	10,406	8,692	11,904
Apr.	4,259	4,824	5,627	4,453	4,746	5,325	10,170	8,788	12,218
May	3,892	4,819	4,956	3,451	4,919	5,028	10,615	8,719	12,107
June	3,480	5,035	4,716	4,024	5,504	5,027	10,050	8,105	11,74c
July	3,251	5,177	4,019	5,269	5,758	5,046	8,005	7,725	10,869
Aug.	3,894	5,039		4,556	5,136		6,939	7,621	
Sept.	4,125	5,161		3,426	4,231		7,565	8,627	
Oct.	4,435	5,397		3,987	4,108		8,053	9,977	
Nov.	3,942	4,739		3,687	3,995		8,161	10,732	
Dec.	4,048	5,121		3,962	4,819		8,231	10,985	

(1) These figures have been adjusted to represent 100% of the industry based on reports received by the Rubber Manufacturers' Association which represent 80% for 1931-1932-1933; 97% for 1934-1935; 81% for 1936. All figures through September, 1936, were revised in December, 1936. Annual figures are more accurate.
(2) Held by manufacturers at end of period indicated.
(*) Revised.

Automobile Production

	United States Total	Passenger Cars	Trucks	Canada Total	Passenger Cars	Trucks	Grand Total
1928	4,357,384	3,826,613	530,771	242,382	196,737	45,645	4,599,944
1929	5,358,420	4,587,400	771,020	263,295	207,498	55,797	5,621,715
1930	3,355,986	2,814,452	540,534	154,192	125,442	28,750	3,510,178
1931	2,389,730	1,973,090	416,640	82,621	63,477	19,144	2,472,351
1932	1,370,678	1,135,493	235,187	60,816	50,718	10,098	1,431,494
1933*	1,920,057	1,573,512	346,545	65,924	53,855	12,069	1,992,126
1934*	2,753,111	2,177,919	575,192	116,852	92,647	24,205	2,869,963
1935*	3,946,934	3,252,244	694,690	172,877	135,562	37,315	4,119,811
1936*	4,454,115	3,669,528	784,587	162,159	128,369	33,790	4,616,274
1936							
Oct.*	224,688	190,242	34,446	5,361	4,592	769	230,049
Nov.*	394,987	341,085	53,902	10,812	10,086	726	405,799
Dec.*	498,710	425,365	73,345	20,411	16,542	3,869	519,121
1937							
Jan.*	380,051	309,637	70,414	19,583	14,697*	4,886*	399,634
Feb.*	363,991	296,636	67,355	19,707	14,173*	5,534*	383,698
Mar.*	494,276	403,879	90,397	24,901*	19,127*	5,774*	519,177
Apr.	536,334	439,980	96,354	17,081	12,927	4,154	553,415
May	516,899	425,432	91,467	23,458	17,980	5,478	540,357
June	497,298	411,394	85,904	23,841	17,919	5,922	521,139
July*	438,968	360,403	78,565	17,941	12,513	5,428	456,909
Aug.	394,322	311,456	82,866	10,742	5,814	4,928	405,064

* Revised.
Note: U. S. figures represent factory sales; Canadian figures represent production.

Exports of Crude Rubber from Principal Producing Countries

(Long Tons)

	BRITISH MALAYA [1]								DUTCH EAST INDIES [6]						
	Gross Exports	Imports	Gross Exports Minus Imports	Ceylon [2]	India & Burma [3]	Sarawak [4]	British North Borneo [5]	Siam [6]	Java & Madura	Sumatra E. Coast	Other D.E.I.	Indo-China [3]	Amazon Valley	All Other [6]	World Total [7]
1923	252,016	70,432	181,584	39,971	6,416	5,705	4,237	1,718	32,930	46,344	57,822	5,067	16,765	7,856	406,415
1924	259,706	108,524	151,182	39,997	7,697	6,699	4,621	2,962	42,446	54,497	80,347	6,688	23,165	9,065	429,366
1925	316,825	158,022	158,803	49,566	10,082	5,424	5,377	5,377	46,757	65,499	120,626	7,881	25,298	13,797	514,487
1926	391,328	151,243	240,085	58,962	9,874	9,155	6,079	4,027	52,186	71,413	121,231	8,203	24,298	16,017	621,530
1927	371,322	182,845	188,477	55,356	11,321	10,923	6,582	5,472	55,297	77,815	142,171	8,645	28,782	15,633	606,474
1928	409,430	149,787	259,643	57,267	10,790	10,087	6,698	4,813	58,848	82,511	121,770	9,548	21,129	10,690	653,794
1929	574,836	163,092	411,744	81,584	11,663	11,077	7,381	5,018	65,990	87,789	134,037	9,696	21,148	6,767	853,894
1930	547,043	133,876	413,167	76,970	10,782	10,309	6,781	4,251	69,755	79,396	115,254	7,665	14,260	5,651	814,241
1931	519,740	125,506	394,234	61,769	8,470	10,451	6,247	4,218	75,952	87,747	116,009	11,696	12,121	3,292	792,203
1932	478,252	92,539	385,713	48,973	3,888	6,960	4,664	3,451	61,312	79,837	85,871	13,883	6,450	1,816	702,818
1933	573,412	167,377	406,035	63,351	4,527	10,874	7,555	7,765	73,851	91,861	149,659	18,394	9,883	2,737	846,312
1934	677,361	211,803	465,558	79,746	10,492	17,233	11,103	17,545	87,400	112,058	175,470	20,170	8,903	2,985	1,008,663
1935	590,319	174,652	415,667	54,316	13,968	19,465	8,885	28,327	57,488	78,325	139,297	28,816	11,275	8,745	864,574
1936	520,286	167,799	352,487	49,692	14,724	21,243	8,177	33,702	61,307	84,577	152,205	40,782	14,193	11,466	845,431
1935:															
Dec.	37,838	7,529	30,309	4,942	3,028	1,233	171	3,079	3,881	5,206	3,854	4,532	1,352	1,122	62,709
1936:															
Jan.	39,101	12,582	26,519	4,178	1,299	2,317	938	1,665	4,315	6,347	9,381	2,449	1,606	839	61,853
Feb.	38,436	18,857	19,579	3,664	1,382	2,107	529	3,663	4,789	6,643	15,851	2,892	1,201	1,051	63,353
Mar.	46,552	12,026	34,526	4,336	1,324	1,848	342	2,966	4,484	5,052	9,225	2,553	1,264	751	68,671
Apr.	36,251	14,702	21,549	3,172	1,230	2,053	869	1,596	4,895	6,446	13,032	2,416	1,056	947	59,261
May	46,568	12,527	34,041	2,560	1,117	2,354	517	2,077	4,258	6,015	10,766	2,281	956	776	67,718
June	40,049	15,026	25,023	3,766	1,226	1,386	461	3,737	4,577	6,519	14,588	2,733	917	823	65,756
July	53,114	19,038	34,076	3,773	1,359	1,399	1,035	3,734	6,133	8,578	17,946	2,738	964	933	82,668
Aug.	43,506	13,361	30,145	3,940	776	2,541	656	3,284	4,978	7,353	12,106	3,017	542	1,054	70,392
Sept.	44,110	10,039	34,071	5,367	664	1,139	537	3,259	4,531	6,241	10,175	3,505	1,119	937	71,545
Oct.	46,543	12,960	33,583	5,599	1,181	2,143	1,086	3,349	6,477	8,145	12,881	3,874	1,255	1,105	80,678
Nov.	47,342	16,923	30,419	4,960	1,322	1,950	701	2,260	5,398	7,109	16,718	3,872	1,592	1,163	77,464
Dec.	38,714	9,758	28,956	4,377	1,844		506	2,988	6,472	10,129	9,536	8,450	1,721	1,087	76,072
1937:															
Jan.	41,571	16,956	24,615	4,541	1,077	4,063	1,234	3,849	5,136	8,011	13,102	2,828	1,271	1,000*	70,727
Feb.	38,058	14,048	24,010	5,619	1,831	2,043	790	3,554	5,484	7,656	12,414	3,074	1,692	1,000*	69,167
Mar.	59,568	19,579	39,989	7,066	2,040	1,425	1,239	3,873	7,791	11,848	19,969	3,173	1,749	1,000*	101,162
Apr.	58,718	17,136	41,582	3,423	1,203	2,960	783	1,899	6,999	8,967	15,989	2,094	1,522	1,000*	88,421
May	51,152	17,350	33,802	4,612	1,012	742	778	2,238	7,530	8,981	21,085	2,887	1,063	1,000*	85,730
June	54,809	23,614	31,195	5,180	1,100	1,890	813	2,933	8,269	12,467	25,225	3,669	762	1,000*	94,503
July	72,704	26,100	46,604	6,285	976	2,543	1,414	3,195	7,512	11,610	23,913	5,563	854*	1,000*	111,469
Aug.	64,525	21,398	43,127	7,336	632	1,624	1,189	2,999	6,785	11,635	21,054	2,272	1,300*	1,000*	100,953
Sept.	67,414	19,065	48,349												

(1) Malayan net exports cannot be taken as production, since imported rubber is largely wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 115 tons in 1923, 1,117 in 1924, 3,618 in 1925, 3,263 in 1926, 2,439 in 1927, 1,437 in 1928, 2,670 in 1929, and 1,274 in 1930. (2) Ceylon Chamber of Commerce statistics until 1926; rubber exported as latex is not included—such shipments were equivalent to 18 tons in 1923, 93 tons in 1924, 6 tons in 1925, 20 tons in 1926, about ¼ ton in 1927, and 1 ton in 1928, and practically none in 1929, 1930 and 1931. (3) Official statistics. (4) Imports into Singapore and Penang. (5) Exports from "Other D.E.I." are chiefly wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 2,342 tons in 1923, 1,008 tons in 1924, 2,239 tons in 1925, 44 tons in 1926, 84 tons in 1927, 1,459 tons in 1928, 1,302 tons in 1929, and 2,656 tons in 1930. (6) Calculated from official import statistics of principal consuming countries, viz., United States, United Kingdom, France, Germany, Belgium and Netherlands, and includes guayule rubber. (7) This total includes the third column for British Malaya, "Gross Exports minus Imports," and all the figures shown for the other territories. * Figure is provisional; final figure will be shown when available.

NOTE: ANNUAL FIGURES ARE MORE ACCURATE; THEY ARE REVISED AT THE END OF THE FOLLOWING YEAR.

Net Imports of Crude Rubber into Principal Manufacturing Countries

(*Long Tons*)

	United States [1]	United Kingdom	France (h)	Germany	Canada (ac)	Japan (da)	Italy	Russia (ce)	Australia (cd)	Belgium (d)	Netherlands	Scandinavia (abcdf)	Spain (g)	Czechoslovakia (abcd)	World Total
1919	238,407	42,671	17,685	5,584	6,395	9,753	9,894	75	1,002	3,995	2,771	3,149	2,418	9	343,808
1920	249,530	56,844	13,885	11,890	11,746	5,297	6,123	62	1,815	3,840	5,510	2,292	2,008	567	371,409
1921	179,736	42,087	15,135	21,920	8,124	21,713	3,906	165	1,014	1,705	1,022	1,279	2,245	569	300,620
1922	296,594	11,724	24,352	27,546	9,207	15,934	6,430	2,493	2,643	172	—3,807	1,778	589	567	396,222
1923	301,527	12,700	27,392	18,519	13,277	15,372	8,489	2,986	1,649	2,184	792	2,528	630	1,128	409,173
1924	319,103	—11,550	30,446	22,727	14,299	19,571	8,764	2,346	3,124	2,688	—807	3,178	944	1,370	416,203
1925	385,596	4,061	32,956	33,937	19,683	11,117	11,412	7,088	4,757	2,930	875	3,149	1,155	1,558	520,274
1926	399,981	84,865	34,240	22,775	20,229	18,125	9,809	6,529	9,021	2,498	2,670	4,646	1,299	1,870	617,957
1927	403,472	60,249	34,271	38,892	26,405	20,521	11,381	12,018	9,490	6,482	636	4,224	2,055	2,672	632,768
1928	407,572	4,846	36,498	37,855	30,447	25,621	12,433	15,134	8,430	7,958	2,243	4,418	3,178	3,138	599,771
1929	528,608	122,675	55,093	49,275	35,453	34,284	17,169	11,774	15,886	9,445	3,024	6,440	864	4,650	894,638
1930	458,036	120,069	68,503	45,488	28,793	33,039	18,639	16,387	5,354	10,635	2,924	7,710	2,400	4,468	822,445
1931	475,993	86,170	46,466	39,688	25,261	43,483	10,149	30,671	7,649	11,009	2,220	6,360	2,605	7,717	794,641
1932	393,844	44,086	42,506	45,121	20,917	56,027	14,469	30,637	12,576	9,519	2,851	7,262	4,359	9,444	693,618
1933	398,365	73,335	61,953	54,120	19,332	66,831	19,341	29,830	13,534	11,166	1,243	7,831	5,520	10,402	772,803
1934	439,172	158,482	49,560	59,330	28,439	69,905	21,398	47,271	9,642	9,115	3,758	12,418	6,900	10,999	926,389
1935	455,758	128,829	51,450	62,899	26,870	57,567	21,880	37,572	9,978	7,593	4,068	11,878	8,140	11,245	895,727
1936	475,359	—2,591	57,032	71,794	27,871	61,223	17,000*	30,967	14,109	9,648	2,888	11,236	6,668	8,772	791,976
1936:															
May	35,549	302	4,335	4,639	2,221	5,531	1,000*	4,220	1,034	698	103	657	500*	667	61,456
June	35,901	—1,493	4,846	5,698	2,042	4,567	1,500*	2,427	1,635	579	—27	650	500*	323	59,148
July	38,556	—766	4,621	6,837	2,274	5,126	2,000*	1,733	1,363	713	183	1,094	500*	495	64,729
Aug.	41,094	—1,581	4,513	6,556	3,781	4,305	1,500*	3,128	807	789	42	1,145	500*	989	67,440
Sept.	49,483	—12	4,393	6,006	2,393	5,195	1,500*	2,922	2,297	514	471	1,090	300*	624	77,176
Oct.	40,301	—87	4,752	7,232	3,110	6,600	1,500*	2,761	1,092	817	343	1,171	200*	1,026	70,818
Nov.	37,897	—742	3,282	6,500	4,308	3,961	1,500*	2,162	964	1,090	445	1,388	200*	823	63,778
Dec.	50,838	—4,926	4,688	7,458	1,193	8,698	1,500*	3,426	1,184	759	276	1,206	200*	1,701	78,201
1937:															
Jan.	42,655	33	4,430	7,041	1,632	8,357	1,700	2,633	582	854	269	1,115	200*	567	72,368
Feb.	44,398	—222	5,296	7,911	1,271	6,630	1,502	3,048	304	1,363	245	452	200*	837	73,233
Mar.	39,888	343	5,347	7,668	2,612	6,935	2,119	3,598	1,293	1,641	371	709	200*	601	72,727
Apr.	42,066	3,808	5,291	8,664	1,343	5,837	1,669	1,532	1,058	1,069	362	1,070	200*	1,445	80,414
May	48,506	6,100	5,558	6,706	4,187	8,596	2,772	1,886	1,290	2,113	361	1,576	200*	925	90,776
June	48,972	5,157	6,010	6,469	3,791	7,608	1,958	3,940	2,226	1,630	521	1,802	200*	1,150	91,434
July	43,018	10,628	4,306	7,860	1,946	4,851	2,719	2,150	1,902	851	497	1,409	200*	753	83,090
Aug.	49,485	15,757	4,488	8,752		4,409			2,114	1,013	382				

a—Including gutta percha. b—Including balata. c—Re-exports not deducted in monthly statistics. d—Including some scrap and reclaimed rubber. e—Official statistics of rubber imports by Soviet Russia. f—Including Norway, Sweden, Denmark and Finland. g—United Kingdom and French exports to Spain except in years prior to 1925. h—French imports have been reduced 12 per cent in order to eliminate imports of gutta percha and to reduce to basis of net weight. [1] United States imports of guayule are included in this compilation. * Figure is provisional; final figure will be shown when available.

NOTE: ANNUAL FIGURES ARE MORE ACCURATE; THEY ARE REVISED AT THE END OF THE FOLLOWING YEAR.

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